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Text Book of
Environmental Biology

Dr. G. Durai Muthu Mani

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TEXT BOOK OF
ENVIRONMENTAL BIOLOGY

Dr. G. Durai Muthu Mani

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Book Title

TEXT BOOK OF ENVIRONMENTAL BIOLOGY

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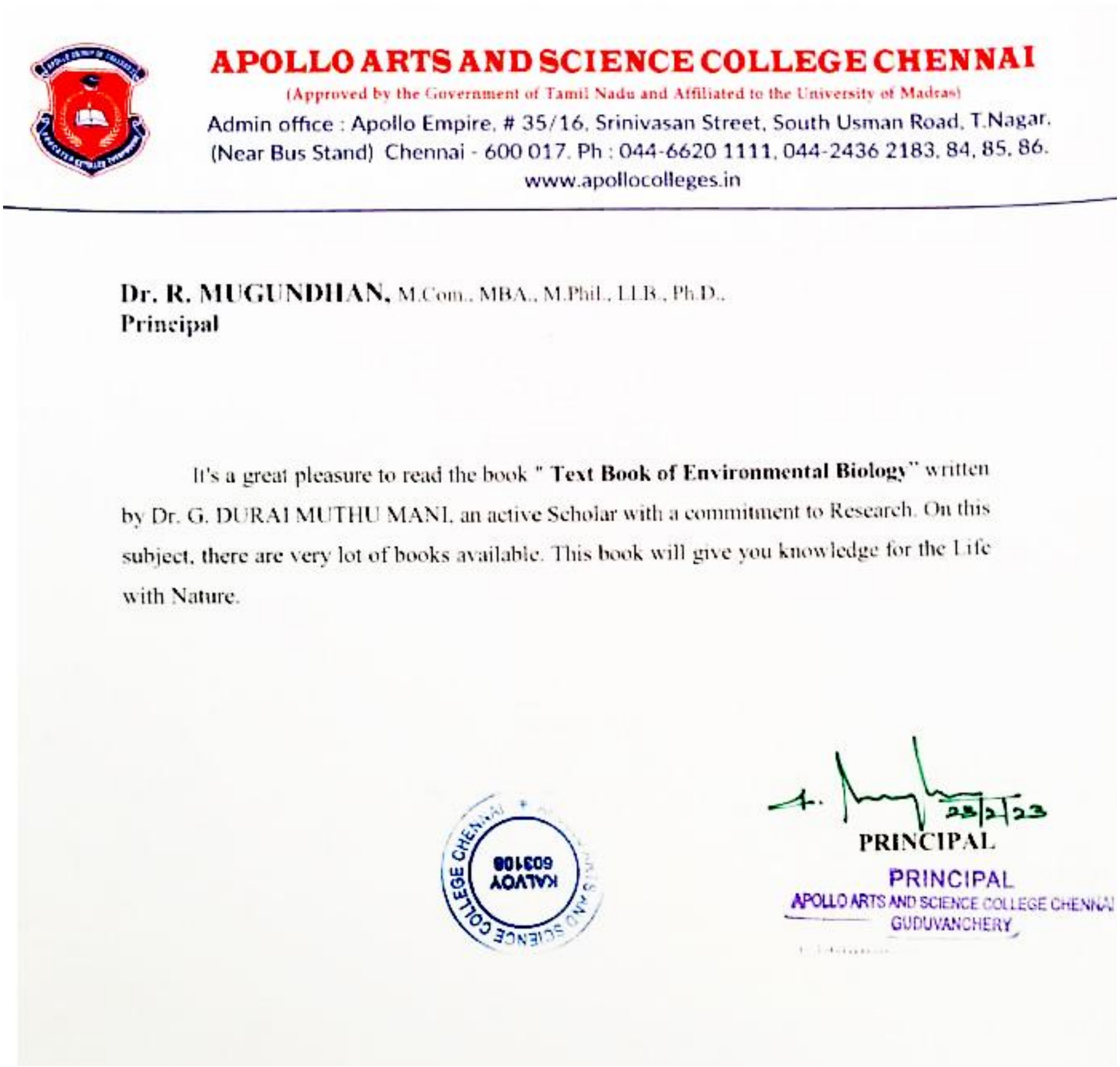

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Principal

It's a great pleasure to read the book " **Text Book of Environmental Biology**" written by Dr. G. DURAI MUTHU MANI, an active Scholar with a commitment to Research. On this subject, there are very lot of books available. This book will give you knowledge for the Life with Nature.

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சுற்றுப் புறம் பேணி வாழ்வது நன் முறை!

சேர்ந்து வாழ்தல் ஒற்றுமையின் வலிமை!

சார்ந்து வாழ்தல் உலகத்தின் பெருமை!

ஆம்!

நாம் சுற்றுப் புறத்தைச் சார்ந்து வாழ்வதும்

சுற்றுச் சூழலைப் பேணி வாழ்தலும் நாம்

இந்த உலகத்தில் வாழ்ந்தற்கான

அடையாளம்!

உலகம் நமக்கு வழங்கிய இயற்கைச்

செல்வங்களாகிய கொடையை அடுத்த

தலைமுறைக்கு முழுமையாக விட்டுச்

செல்வதே நாம் வாழ்ந்தற்கான

அடையாளம்! அதுவே,

நம் கடமையும் கூட:

சுற்றுச் சூழலைப் பேணுவோம்!

சுழலும் உலகிற்கு அதனை

அணியாகப் பூணுவோம்!

சி.குருபால்ராஜ்

சி.குருபால்ராஜ்

PREFACE

Our environment faces challenges like ozone layer depletion, global warming and loss of biodiversity due to the exploitation of the natural resources. Also rapid population growth and urbanisation in the developing countries result in environmental health risks. Therefore, it is necessary to have a thorough understanding of environmental science.

So I believe that this book will fulfilled the needs of the Nature.

November - 2022

Author

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SYLLABUS

Unit 1: Introduction to Environmental Studies

- Multidisciplinary nature of environmental studies;
- Scope and importance; concept of sustainability and sustainable development.

Unit 2 : Ecosystem

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: Food chains, food webs and ecological succession, Case studies of the following ecosystem:

a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystem (ponds, stream, lakes, rivers, ocean, estuaries)

Unit 3: Natural Resources : Renewable and Non – renewable Resources

- Land resources and land use change: Land degradation, soil erosion and desertification.
- Deforestation : Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water : Use and over –exploitation of surface and ground water, floods, droughts, conflicts over water(international and inter-state).
- Energy resources : Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit 4: Biodiversity and Conservation

- Levels of biological diversity: genetics, species and ecosystem diversity, Biogeographic zones of India: Biodiversity patterns and global biodiversity hot spots India as a mega- biodiversity nation, Endangered and endemic species of India.
- Threats to biodiversity: Habitat loss, poaching of wildlife, man- wildlife conflicts, biological invasions; Conservations of biodiversity: In-situ and Ex-situ Conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit 5: Environmental Pollution

- Environmental pollution: types, causes, effects and controls: Air, Water, soil and noise Pollution.
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste
- Pollution case studies.

Unit 6: Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act, Air (Prevention & Control of Pollution) Act; Water (Prevention and Control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human Wildlife conflicts in Indian context.

Unit 7: Human Communities and the Environment

- Human population growth, impacts on environment, human health and welfare.
- Resettlement and rehabilitation of projects affected persons; case studies.
- Disaster management: floods, earthquake, cyclone and landslides.
- Environmental movements : Chipko, Silent Valley, Bishnois of Rajasthan.
- Environmental ethics : Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies(e.g. CNG Vehicles in Delhi)

QUESTION BANK

APRIL-2015, 2016, 2017, 2018, 2019, 2021 & NOVEMBER-2016, 2019, 2020 (*- REPEATED QUESTIONS)

PART A — (5 marks)

1. Discuss the need for public awareness toward environmental education. (pg.no-104)
2. Write about the effects of fertilizers and pesticides on environment. (pg.no-35)
3. What are the various ways by which energy could be conserved?(pg.no-37)
4. Write about ecological succession.
5. What do you mean by hot spots of biodiversity? Explain its significance.(pg.no-53)
6. Discuss the causes and effects of marine pollution. (pg.no-80)
7. What are the major urban problems related to energy? (pg.no- 79)
8. Discuss the importance of value education in relation to environment.(pg.no- 113)
9. Give an account of land resources.*(pg.no-44)
10. Discuss the food chain and food web of an ecosystem. *(pg.no-13)
11. Examine the mega biodiversity status of India. (pg.no- 50)
12. Give an account of watershed management. (pg.no-75)
13. Explain the concept of population explosion. (pg.no-109)
14. Analyse the measures taken by the government for women and child welfare.(pg.no-105)
15. Analyse the need for the environmental studies in the Indian context. (pg.no-6)
16. Explain the impact of exploitation of mineral resources.(pg.no- 30)
17. List down the endangered species of India.(pg.no- 54)
18. Describe the causes, effects and control measures of soil pollution.(pg.no-78)
19. Explain the various legal provisions available to protect the environment. (pg.no-100)
20. Briefly explain ozone layer depletion. (pg.no- 94)
21. What do you mean by human rights?**(pg.no-112)
22. Write about the causes of water scarcity. (pg.no-28)
23. Explain the significance of nuclear and wind energy.(pg.no-39 & 40)
24. Discuss the salient aspects of desert ecosystem. (pg.no- 12)
25. Write about the various legislative measures to protect endangered species.(pg.no54)
26. What are the effects of soil pollution?(pg.no-78)
27. Define the following terms:

(a) Acid rain(pg.no-92)

(b) Global warming.(pg.no-91)

28. Discuss the importance of women and child welfare in India.(pg.no-105)
29. Write about the importance of environmental studies.(pg.no- 5)
30. Discuss the over-exploitation of natural resources. (pg.no- 15)
31. Write about the ecosystem.(pg.no- 7)
32. Give an account on conservation of biodiversity.(pg.no-59)
33. Explain the wild life protection act.(pg.no-102)
34. How water gets polluted?(pg.no-75)
35. Discuss the role of environment and human health.(pg.no-111)
36. Explain the environmental need for public awareness. (pg.no- 104)
37. Deforestation- Explain(pg.no-19)
38. Explain the Nuclear Hazards.(pg.no- 85)
39. Enumerate the uses and exploitation of mineral resources.(pg.no- 30)
40. Explain the role of individual in prevention of pollution. (pg.no- 100)
41. Describe the effects and control measures of industrial wastes.(pg.no-79)
42. Write an account on wasteland reclamation.(pg.no- 97)
43. Write the role of information technology in Environment and human health. (pg.no-111)
44. Explain the structure of ecosystem.(pg.no-8)
45. Water management act-Discuss.(pg.no-101)
46. Give a brief note on effects of modern agriculture and fertilizer - pesticide problems.(pg.no- 35)
47. Write an account on soil erosion and desertification. (pg.no-45 & 48)
48. Explain genetic and species diversity. (pg.no-49)
49. Write the endangered and endemic species of India.(pg.no- 54)
50. Write an account on flood disaster management.(pg.no-28 & 106)

PART B — (10 marks)

1) What are the forest resources of India? How could they be conserved?(pg.no-17)
2) Discuss the environmental extracting mineral resources. (pg.no-30)
3) Give an account of ecological pyramids. (pg.no- 13)
4) Discuss the structure and function of desert ecosystem.(pg.no- 12)
5) Write about the biogeographical classification of India.
6) Write an essay on the conservation of biodiversity. *(pg.no-59)
7) Explain the sources, effects and control of thermal and nuclear pollution.(pg.no-71 & 76)
8) Give an account of solid waste management. **(pg.no- 86)
9) What are the causes of global warming and acid rain? Add a note on ozone layer depletion. (pg.no-92)
10) Health is Wealth' - Justify this statement with specific reasons.
11) Discuss the mineral resources.(pg.no- 30)
12) Examine the role of an individual in the conservation of natural resources.(pg.no- 48)
13) Describe the desert and grassland ecosystems.(pg.no- 10 & 11)
14) How will you conserve the biodiversity?*Explain with suitable examples.(pg.no-64)
15) Critically examine the causes, effects and control measures of air pollution. **(pg.no- 73)
16) Analyse the role of an individual in the prevention of pollution.(pg.no-88)
17) Discuss the legal provisions of environmental protection.(pg.no- 100)
18) Analyse the change and climate its implications. (pg.no- 90)
19) Write an essay on human rights and value education. (pg.no-112)
20) Examine the role of information technology in environment and human health. *****(pg.no-117)
21) Discuss the water resources.(pg.no- 22)
22) Write an essay on energy resources.(pg.no- 36)
23) Describe the ecological succession.
24) Discuss the levels of bio diversity.*(pg.no-49)
25) Critically examine the causes, effects and control measures of marine pollution.(pg.no- 80)
26) Explain in detail the noise pollution. (pg.no- 81)
27) Illustrate the benefits of watershed management and rain water harvesting.*(pg.no-28)
28) Analyse the causes for the energy crisis in urban systems.
29) Give an account of the population growth.(pg.no-107)

30) What are the various mode of transmission of HIV/AIDS? Name the preventive methods. (pg.no- 115)
31) What are the changes caused by agriculture? Add a note on the effects of modern agriculture.(pg.no- 35)
32) Enumerate the different ways in which we can save energy.(pg.no- 37)
33) Discuss the structure and function of an aquatic ecosystem, (pg.no- 12)
34) Give an account of the pyramid of energy and pyramid of numbers.(pg.no-13)
35) Discuss the present status of Indian wildlife. Add a note on man-animal conflicts
36) Explain the two methods of conservation of biodiversity.(pg.no-59)
37) Discuss the role of an individual in the prevention of pollution.(pg.no-72)
38) Give brief account on nature of environmental studies and explain need for public awareness.(pg.no- 6 and 104)
39) Describe the food resources.(pg.no-33)
40) Describe the structure and function of ecosystem.*(pg.no- 8)
41) Explain the energy flow in the ecosystem. (pg.no-10)
42) Give brief account on India as a mega- diversity nation.(pg.no- 49)
43) Describe hot-spots of biodiversity.(pg.no-49)
44) Why waste management is necessary? What are the common waste management methods?(pg.no- 86)
45) Discuss any five legal provisions to protect the environment(pg.no-100)
46) Give brief account on scope of environmental studies.(pg.no-5)
47) Describe the renewable resources.*(pg.no-16)
48) Discuss the types and effects of land pollution.
49) Discuss the importance of women and child welfare in India.*(pg.no- 105)
50) Describe In-situ and Ex-situ conservation of Biodiversity.(pg.no- 59)
51) Explain the causes, effects and control measures of noise and thermal pollution.(pg.no- 76)
52) Describe Earthquake and Cyclone disaster management.(pg.no- 120)
53) Give an account on Wildlife Protection Act and Forest Conservation Act. . (pg.no- 103)
54) Give a elaborate note on Environment Protection Act. (pg.no- 100)
55) Discuss the issues and possible solutions for Environmental ethics.(pg.no-106)
56) Give a detailed note on population growth and explosion. (pg.no- 107)
57) Describe the characteristics, features, structure and functions of forest ecosystem.(pg.no- 10)
58) Discuss the threats to Biodiversity. **(pg.no- 67)
59) Describe the role of an individual in conservation of natural resources.(pg.no-48)

Chapter-I
Introduction to Environmental Studies

Introduction to Environmental Studies

- Multidisciplinary nature of environmental studies;
- Scope and importance; concept of sustainability and sustainable development.

Definitions (5mark)**

1. Environment

Environment is defined as “the sum of total of all the living and non-living things around us influencing one another”.

2. Environmental Science

Environmental science is the study of the environment, its biotic (i.e., biological) and abiotic (i.e., non biological) components and their interrelationship.

3. Environmental Engineering

Environmental Engineering is the application of engineering principles to the protection and enhancement of the quality of the environment and to the enhancement and protection of public health and welfare.

4. Environmental Studies (or) Environmental Education

Environmental studies are the process of educating the people for preserving quality environment.

Scope of Environment Studies (10 marks)*

Environmental studies or environmental science is a vast subject. It is a multi-disciplinary subject, consisting of many subjects like geology, ecology, geography, chemistry physics, sociology, history, economics, political science, commerce, management sciences etc.

Environmental studies cover a number of aspects as follows.

1. It studies the functions of the various components of environment such as abiotic components and biotic components.
2. It studies how all the components of nature and living organisms including man adapt and interact with each other.
3. It is concerned with the analysis of the processes in water, air, land and organisms which lead to environmental pollution or environmental degradation.
4. It studies the effects of environmental pollution and measures for controlling it.
5. It set scientific basis for establishing standards, which are accepted as safe, clean and healthy for man, animals, birds, plants, aquatic life etc.
6. It studies vital issues concerning humanity, clean drinking water, fresh air, hygienic living conditions, fertile soils, ecological balance, environmentally sustainable development etc.
7. It deals not only with environmental problems which are of local importance but also with global environmental issues, such as greenhouse effect and global warming, acid rain, depletion of ozone layer, depletion of forests, loss of wildlife, energy crisis, etc.
8. It also covers the study of environmental law, environmental management and sustainable development.

Importance (Or) Siginificance Of Environmental Studies

- Need of development without destruction of environment.
- People can gain the knowledge of different types of environment and the effects of different environmental hazards.
- Protecting the environment by demanding changes.

Need For Public Awareness

- Increasing population, urbanization and poverty have generated pressure on the natural resources and lead to a degradation of the environment.
- Government and Non- government agencies to take part to protect our environment.

Chapter-II Ecosystem

Ecosystem

What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: Food chains, food webs and ecological succession, Case studies of the following ecosystem:

a) Forest ecosystem
b) Grassland ecosystem
c) Desert ecosystem
d) Aquatic ecosystem (ponds, stream, lakes, rivers, ocean, estuaries)

Ecosystem (5mark)*

An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscape, work together to form a bubble of life. Ecosystems contain biotic or living, parts, as well as abiotic factors, or nonliving parts. Biotic factors include plants, animals, and other organisms.

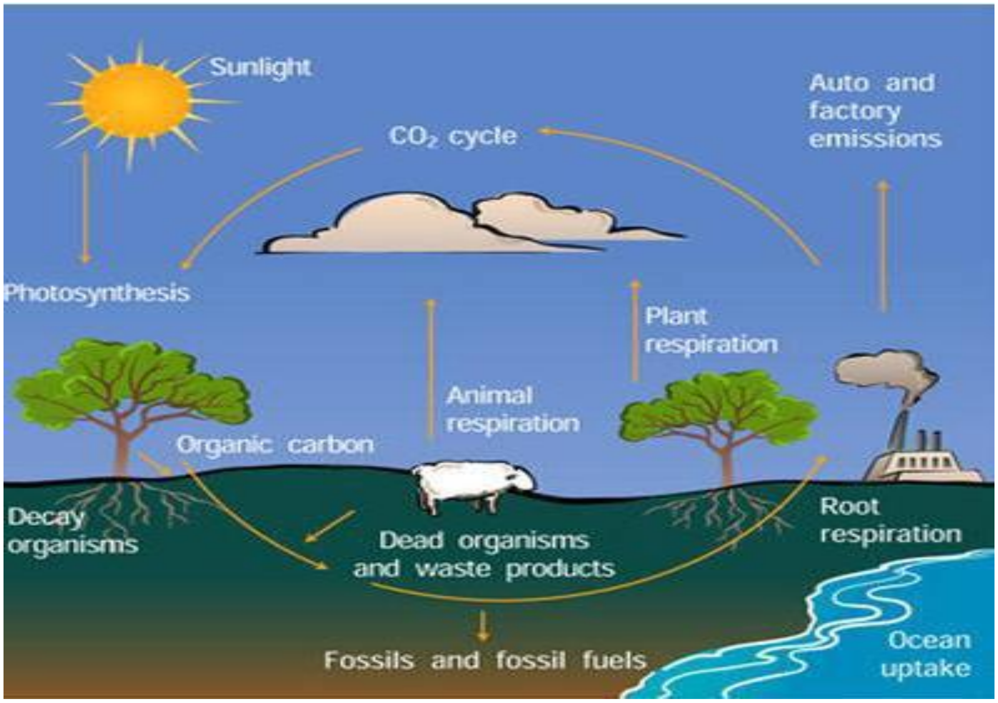


Fig 2.1

Structure of the Ecosystem (10 marks)**

The structure of an ecosystem is characterised by the organisation of both biotic and abiotic components. This includes the distribution of energy in our environment. It also includes the climatic conditions prevailing in that particular environment.

The structure of an ecosystem can be split into two main components, namely:

- Biotic Components
- Abiotic Components

The biotic and abiotic components are interrelated in an ecosystem. It is an open system where the energy and components can flow throughout the boundaries.

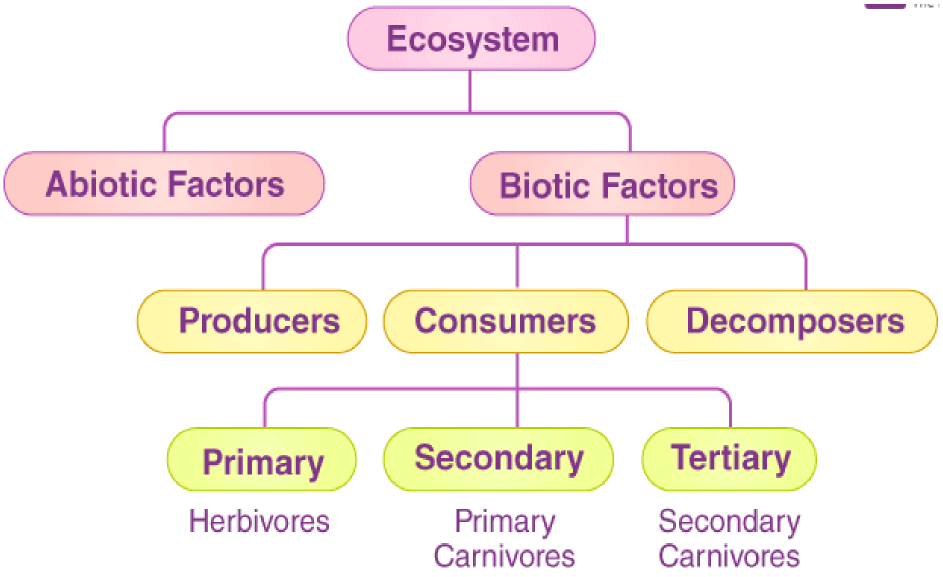


Fig 2.2

➢ Biotic Components

Biotic components refer to all living components in an ecosystem. Based on nutrition, biotic components can be categorised into autotrophs, heterotrophs and saprotrophs (or decomposers).

- Producers include all autotrophs such as plants. They are called autotrophs as they can produce food through the process of photosynthesis. Consequently, all other organisms higher up on the food chain rely on producers for food.

- Consumers or heterotrophs are organisms that depend on other organisms for food. Consumers are further classified into primary consumers, secondary consumers and tertiary consumers.

- *Primary consumers* are always herbivores as they rely on producers for food.

- *Secondary consumers* depend on primary consumers for energy. They can either be carnivores or omnivores.

- *Tertiary consumers* are organisms that depend on secondary consumers for food. Tertiary consumers can also be carnivores or omnivores

- *Quaternary consumers* are present in some food chains. These organisms prey on tertiary consumers for energy. Furthermore, they are usually at the top of a food chain as they have no natural predators.

- Decomposers include saprophytes such as fungi and bacteria. They directly thrive on the dead and decaying organic matter. Decomposers are essential for the ecosystem as they help in recycling nutrients to be reused by plants.

Abiotic Components

Abiotic components are the non-living component of an ecosystem. It includes air, water, soil, minerals, sunlight, temperature, nutrients, wind, altitude, turbidity, etc.

Functions of Ecosystem (10marks)**

The functions of the ecosystem are as follows:

It regulates the essential ecological processes, supports life systems and renders stability. It is also responsible for the cycling of nutrients between biotic and abiotic components. It maintains a balance among the various trophic levels in the ecosystem.

It cycles the minerals through the biosphere.

The abiotic components help in the synthesis of organic components that involve the exchange of energy. So the functional units of an ecosystem or functional components that work together in an ecosystem are:

- **Productivity –** It refers to the rate of biomass production.
- **Energy flow –** It is the sequential process through which energy flows from one trophic level to another. The energy captured from the sun flows from producers to consumers and then to decomposers and finally back to the environment.
- **Decomposition –** It is the process of breakdown of dead organic material. The top-soil is the major site for decomposition.
- **Nutrient cycling –** In an ecosystem nutrients are consumed and recycled back in various forms for the utilisation by various organisms.

Types of Ecosystem

An ecosystem can be as small as an oasis in a desert, or as big as an ocean, spanning thousands of miles.

There are two types of ecosystem:

- Terrestrial Ecosystem
- Aquatic Ecosystem

Terrestrial Ecosystem

Terrestrial ecosystems are exclusively land-based ecosystems. There are different types of terrestrial ecosystems distributed around various geological zones. They are as follows:

- Forest Ecosystem
- Grassland Ecosystem
- Desert Ecosystem

Forest Ecosystem

A forest ecosystem consists of several plants, particularly trees, animals and microorganisms that live in coordination with the abiotic factors of the environment. Forests help in maintaining the temperature of the earth and are the major carbon sink.

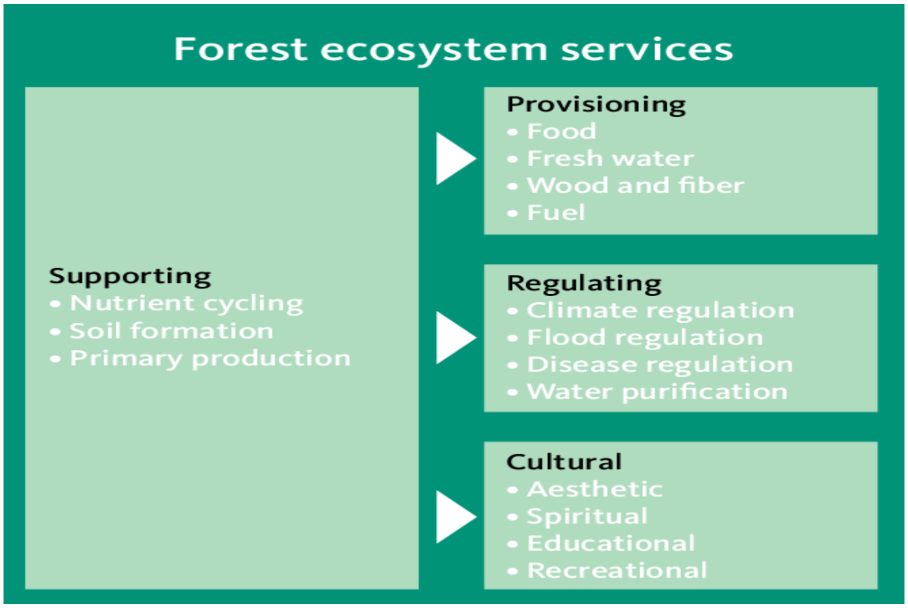


Fig 2.3

Grassland Ecosystem

In a grassland ecosystem, the vegetation is dominated by grasses and herbs. Temperate grasslands and tropical or savanna grasslands are examples of grassland ecosystems.

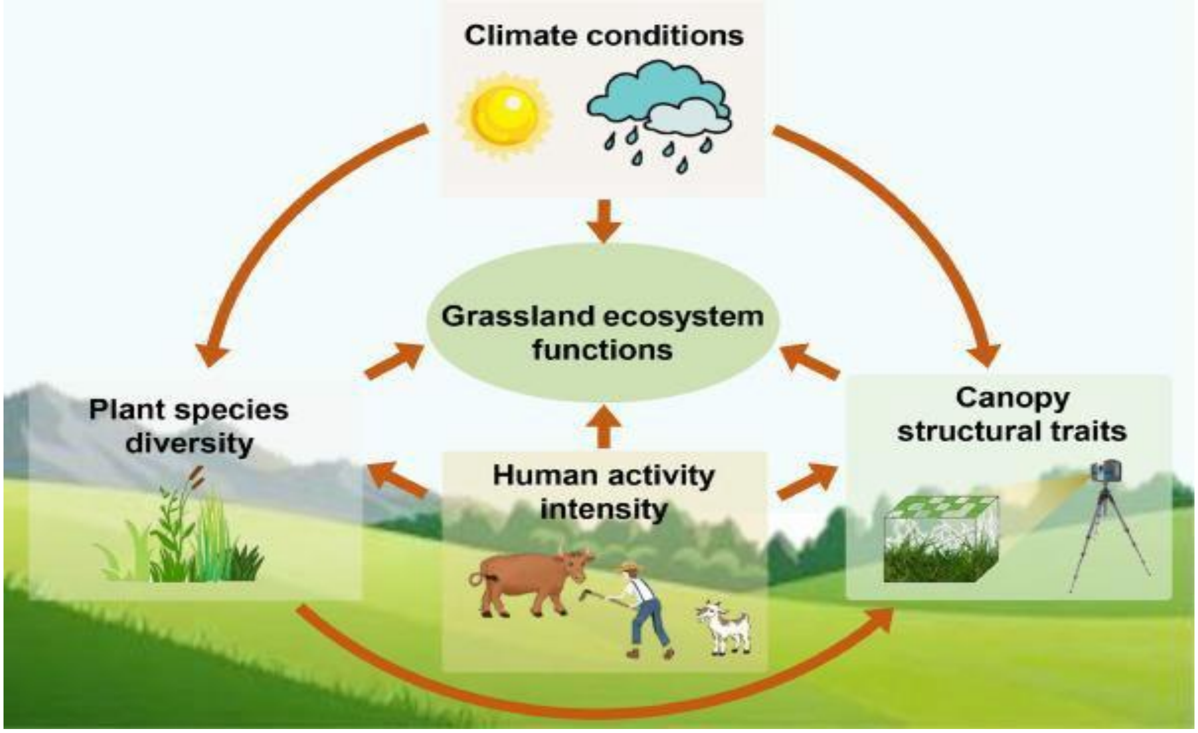


Fig 2.4

Desert Ecosystem (10marks)

Deserts are found throughout the world. These are regions with little rainfall and scarce vegetation. The days are hot, and the nights are cold.

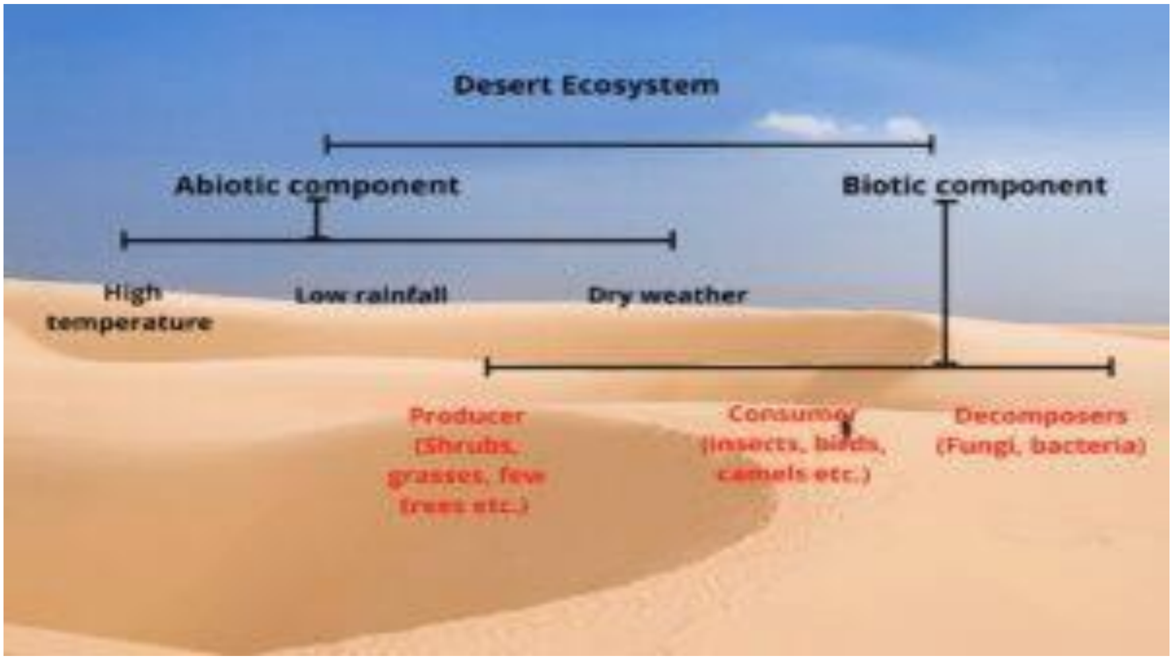

Desert Ecosystem
Abiotic component
Biotic component
High temperature
Low rainfall
Dry weather
Producer (Shrubs, grasses, few trees etc.)
Consumer (insects, birds, camels etc.)
Decomposers (Fungi, bacteria)

Fig 2.5

Aquatic Ecosystem (10marks)

Aquatic ecosystems are ecosystems present in a body of water. These can be further divided into two types, namely:

- Freshwater Ecosystem
- Marine Ecosystem Freshwater Ecosystem

The freshwater ecosystem is an aquatic ecosystem that includes lakes, ponds, rivers, streams and wetlands.

These have no salt content in contrast with the marine ecosystem.

Marine Ecosystem

The marine ecosystem includes seas and oceans. These have a more substantial salt content and greater biodiversity in comparison to the freshwater ecosystem.

Important Ecological Concepts (5 mark & 10 marks)**

1. Food Chain

The sun is the ultimate source of energy on earth. It provides the energy required for all plant life. The plants utilise this energy for the process of photosynthesis, which is used to synthesise their food.

During this biological process, light energy is converted into chemical energy and is passed on through successive trophic levels. The flow of energy from a producer, to a consumer and eventually, to an apex predator or a detritivore is called the food chain.

Dead and decaying matter, along with organic debris, is broken down into its constituents by scavengers. The reducers then absorb these constituents. After gaining the energy, the reducers liberate molecules to the environment, which can be utilised again by the producers.

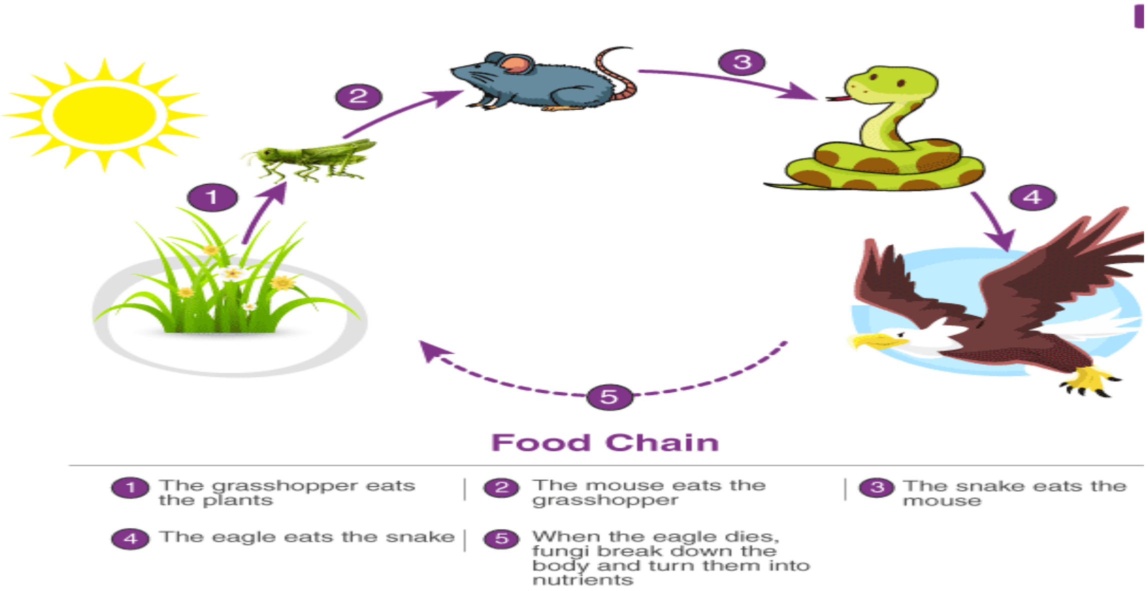

1
2
3
4
5
Food Chain
① The grasshopper eats the plants
② The mouse eats the grasshopper
③ The snake eats the mouse
④ The eagle eats the snake
⑤ When the eagle dies, fungi break down the body and turn them into nutrients

Fig 2.6

2. Ecological Pyramids (10 marks)

An ecological pyramid is the graphical representation of the number, energy, and biomass of the successive trophic levels of an ecosystem. Charles Elton was the first ecologist to describe the ecological pyramid and its principals in 1927.

The biomass, number, and energy of organisms ranging from the producer level to the consumer level are represented in the form of a pyramid; hence, it is known as the ecological pyramid.

The base of the ecological pyramid comprises the producers, followed by primary and secondary consumers. The tertiary consumers hold the apex. In some food chains, the quaternary consumers are at the very apex of the food chain.

The producers generally outnumber the primary consumers and similarly, the primary consumers outnumber the secondary consumers. And lastly, apex predators also follow the same trend as the other consumers; wherein, their numbers are considerably lower than the secondary consumers.

For example, Grasshoppers feed on crops such as cotton and wheat, which are plentiful. These grasshoppers are then preyed upon by common mouse, which are comparatively less in number. The mice are preyed upon by snakes such as cobras. Snakes are ultimately preyed on by apex predators such as the brown snake eagle.

In essence:

Grasshopper →Mouse→ Cobra → Brown Snake Eagle

3. Food Web

Food web is a network of interconnected food chains. It comprises all the food chains within a single ecosystem. It helps in understanding that plants lay the foundation of all the food chains. In a marine environment, phytoplankton forms the primary producer.

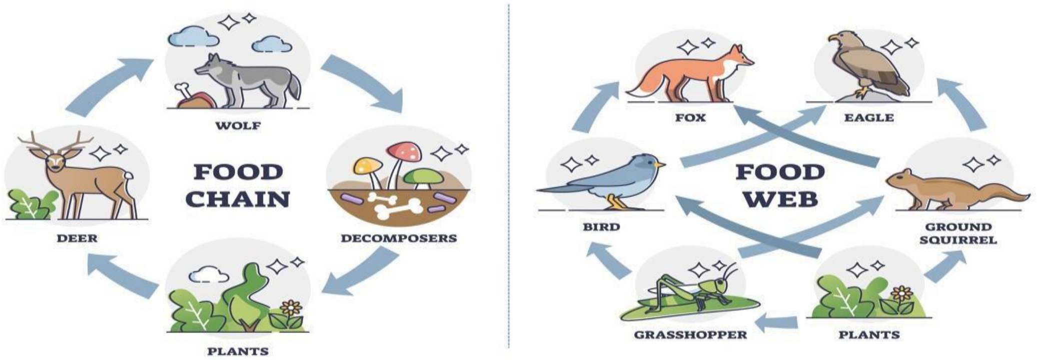


Fig 2.7

Chapter-III Natural Resources : Renewable and Non – renewable Resources

Natural Resources : Renewable and Non – renewable Resources

- Land resources and land use change: Land degradation, soil erosion and desertification.
- Deforestation : Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water : Use and over –exploitation of surface and ground water, floods, droughts, conflicts over water (international and inter-state).
- Energy resources : Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Natural Resources

Types Of Natural Resources

Natural resources are the sources which are useful to man or can be transformed into auseful product.

Natural resources are classified into two types.

- Renewable resources
- Non-renewable resources

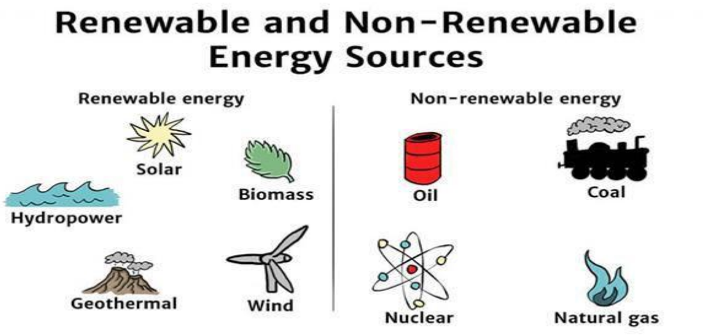


Fig 3.1

Renewable Resources (10 marks)*

These resources are capable of being regenerated by ecological processes within areasonable time period to renew them.

Example: soil, water, air, wildlife, natural vegetation

Types of Renewable Resources Sun

Sunlight is a widely recognized renewable resource. In fact, it's been used throughout human history to warm shelters, dry and cook foods, and heat water. Different technologies exist and continue to be developed to collect and convert solar radiation into heat energy that can be used for various purposes. For example solar photovoltaic (PV) devices, or solar cells, change sunlight into electricity. Depending on the number of solar cells in use, they can power small appliances or provide the electricity for many homes. The challenge with using sunlight for our energy needs is that it can vary and, at times, be unreliable. The availability of sunlight depends on time of day, existing weather conditions, season of the year, and geographic location.

Wind

Wind has a direct relationship to the sun. Daily winds result when the sun's heat is captured unevenly by the varying surfaces on the earth, including oceans and other water masses. Air above land heats up faster than air above water during the day when the sun is shining. That warm air expands and rises. Cooler air takes its place. This creates wind.

Water

Hydropower is the energy produced by water. It was an early renewable source of energy even before it was used to generate electricity. For example, hydropower turned paddle wheels on rivers to mill grain and lumber. Changes in precipitation and lack of water due to droughts can affect hydropower production.

Geothermal

Geothermal is a renewable resource that uses the earth's heat to generate power. Hot springs heated by the earth have been used for centuries for bathing. Geothermal energy has also been used, and still is, for district heating systems.

Biomass

Renewable organic products that produce energy are referred to as biomass. The process of photosynthesis uses energy from the sun to convert biomass resources into chemical energy.

Non -Renewable Resources

These resources are not capable of being regenerated by ecological process. Example: Minerals, coal, natural gas, oil

Forest Resources (10 marks)

Types of Forests

- Evergreen forests.
- Deciduous forests.
- Coniferous forests.

1. Evergreen Forests

Evergreen forests are generally found in the equatorial regions, where the temperatureand rainfall is
very high

Example: The silent valley in Kerala.

2. Deciduous Forests

These forests are of two types

(A) Tropical deciduous forests
(B) Temperature deciduous forests

(A) Tropical deciduous forests

These forests are generally found in the tropical monsoon. As these forests receive onlyseasonal rainfall, they shed their leaves during the summer season Important Trees: Teak, sandalwood, pillaimarudhu.

(B) Temperature deciduous forests

Due to severe winter with heavy snowfall the trees shed their leaves just before thewinter season.

(C) Coniferous Forests

The snow slides down the sloping slides of the trees. The needle typed leaves preserve themoisture.

Important Trees: Pine tree, spruce tree

Functions of Forests

- Forests perform very important both to humans and nature.
- They are habitats to millions of plants, animals and wildlife.
- They recycle rainwater and remove pollutants from air.
- They control water quality and quantity.
- They promote tourism and contribute aesthetic beauty.

Uses (or) Benefits of Forests

1. Commercial Uses

Man depends heavily on a larger number of plant and animal products from forests for hisdaily needs. They provide us a large number of commercial goods.

Table 3.1

Name of the products	Uses
1. Forests supply wood	Used as fuel.
2. Forests supply wood for various industries	Raw materials as pulp, paper, board, timber etc.,
3. Forests supply minor forest products	Like gums, resins, dyes, etc.,
4. Many plants	Are utilized in preparing medicines and
5. Forest produce variety of animal Products	Honey, ivory, hides et.,
6. Many forest lands are used for	Mining, grazing, recreation and for dams.

2. Aesthetic Value

Forests also have aesthetic value and serve as gene reserve of important species.

Example: Tribal‟s utilize bamboo and wild grass for erecting the huts to reside and for making other product like mats, baskets, coats, etc., used in their daily lives.

3. Touristic Value

- Ecotourism provides a growing income for those who have facilitated it.

Over Exploitation of Forest

- Due to over population the materials supplied by the forest like food, medicine, shelter, wood and fuel are not sufficient to meet the people‟s demand

Reason for Over Exploitation in India

- It has been estimated that in India the minimum area of forests required to maintain good ecological balance is about 33% of total area.

Causes of Over Exploitation

- Increasing agricultural production
- Increasing industrial activities
- Increasing in demand of wood resources

Effects (or) Consequences of Over Exploitation

- Over-exploitation of the forest resources led to migration of the farmers.
- Environmental damage caused by over-exploitation is heavy.
- The tropical forests are destroyed at very fast rate.
- Countless plant species and animals are endangered.

Deforestation : Definition (5 mark)

Deforestation is the process of renewal of (or) elimination of forest resources due to many natural (or) man-made activities. In general deforestation means destruction of forests.

Causes of Deforestation

- Developmental projects
- Mining Operations
- Raw materials for industries
- Fuel requirements
- Shifting cultivation
- Forest fires

Consequences (or) ill effects (or) Impact of Deforestation on the Environment

- Global warming
- Loss of genetic diversity
- Soil erosion
- Loss of biodiversity
- Loss of food grains
- Unemployment problems
- Flood and Landslides

Preventive Measures (or) Avoid of Deforestation (or) Methods of Conservation of Forests

- Use of wood and fuel should be discouraged
- Forests pests can be controlled by spraying pesticides by using aero planes
- Forest fire must be controlled by modern techniques.

Timber Extraction

- Due to population growth and lack of alternative fuels, people living nearby forest areaare mostly using wood as fuel.
- Hence, wood (timber) extraction is increasing day by day.

Uses of Timber

- Timber is used as raw materials for various wood based industries like pulp and paper, composite wood, furniture, etc.,
- Timber is also used for various developmental activities like railways, boats, road construction etc.,

Consequences (or) Effects of Timber Extraction

- Large scale timber extraction causes deforestation.
- Timber extraction leads to soil erosion, loss of fertility, landslides and loss of biodiversity.
- Timber extraction reduces thickness of the forest.

Mining

- Mining is the process of extracting mineral resources and fossil fuel like coal from the earth.
- These deposits are found in the forest region and any operation of mining will naturally affect the forest.
- Mining operation requires removal of vegetation along with underlying soil mantle.

Types of Mining

- Surface mining
- Underground mining

Steps Involved in Mining

- Exploration (investigation and searching of minerals)
- Development
- Exploitation (extraction of mineral)
- Ore processing (separation of ore)
- Extraction and purification of minerals.

Effects of Mining (or) Impacts of Mining

- Destruction of natural habitat at the mine and waste disposal sites.
- During mining operation, the vibrations are developed, which leads to earthquake.
- Noise pollution is another major problem from mining operation.
- Mining reduces the shape and size of the forest areas.
- Pollution of surface and ground water resources due to the discharge of waste minerals in water.

Dams and Their Effects on Forests and Tribal People

- Dams are the massive artificial structures built across the river to create a reservoir in order to store water for much beneficial purpose.

Effects of Dam on Forest

- Thousands of hectares of forests have been cleared for executing river valley projects.
- In addition to the dam construction, the forest also cleared for residential accommodation, office buildings, storing material, laying roads, etc.,
- Hydroelectric projects provide opportunities for the spread of water borne diseases.
- Effects of Dam on Tribal People
- The greatest social cost of big dam is the widespread displacement of tribal people; such biodiversity cannot be tolerated.
- The displacement and cultural change affects the tribal people both mentally and
- physically. They do not accommodate the modern food habits and life styles.
- Tribal people are ill-treated by the modern society.
- Many of the displaced people were not recognized and resettled and compensated.
- Tribal people and their culture cannot be questioned and destroyed.
- Generally the body conditions of the tribal people will not suit with the new areas and hence they will be affected by many diseases.

Water Resources (10 marks)

Hydrological Cycle

Hydrological cycle involves the following steps.

1. Evaporation
2. Condensation and precipitation3.Transpiration and respiration

1. Evaporation

- Heat energy from sun constantly causes evaporation from the entire water surface.
- Oceans, rivers, streams, lakes, ponds and the surface of terrestrial organisms lose water due to evaporation.

2. Condensation and Precipitation

- Precipitation occurs due to the condensation of water from a gaseous state in the atmospheres and falls to earth.

3. Transpiration and Respiration

- Organism plays an important role in the water cycle.
- We know that most of the organism contain significant amount of water.
- Plants use the soil water for photosynthesis and to transport materials within them.
- The process of evaporation, condensation and transpiration is called hydrological cycle.

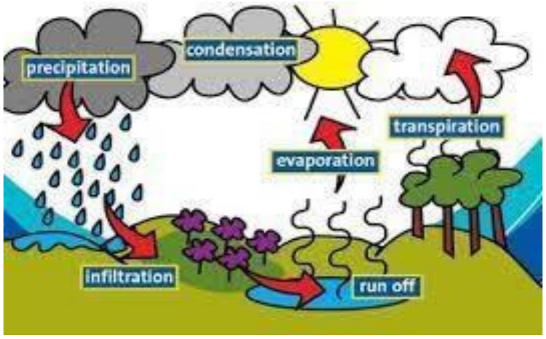


Fig 3.2

Types of Fresh Water Resources

Fresh water resources may be broadly classified into two types

- Surface water
- Standing water bodies: Lakes, reservoirs, estuaries.
- Flowing water bodies: streams, rivers.
- Under ground water.

Surface Water

The water stored on the surface of earth is called surface water.

1.Standing Water Bodies

(a) Lakes

(i) Oligotrophic Lakes: These are generally deep, clear and more deficient in nutrients without much biological activity.

(ii) Eutrophic Lakes: These are lakes having more nutrients and are more turbid andsupport more life.

(iii) Dystrophic Lakes: These are shallow and coloured lakes with a low pH and clogged with plant life.

(b) Reservoirs: These are generally larger than lakes.

(c) Estuaries: These are deltas formed at a mouth of rivers where they join the ocean. The mixing of fresh and salt water gives estuaries.

2.Flowing Water Bodies

- The water which orginate from the point of precipitations and flows in streams andrivers are called flowing water body.

Under Ground Water

- It is found available deep in the ground due to percolation of surface water is called Underground water.

Types of Under Ground Water Systems

1. Aquifer

A layer of highly permeable rock containing water is called an aquifer. Examples

- Layers of sand and gravel are good aquifers.
- Clay and crystalline rocks are not good aquifers.

Types of Aquifers

There are two types of aquifers

- Unconfined Aquifers
- Confined Aquifers

Uses of Water-Different Types

The water is used mainly for two types of uses

1.Consumptive Use

- Here water is completely utilized and it is not reused. Example: In domestic application, industry and irrigation.

2.Non-Consumptive Use

Here water is not completely utilized and it is reused.

3.Other Important Uses of Water

- Water is mainly used for domestic purposes like drinking, cooking, bathing and washing etc.
- Water is also used for the commercial purpose of like hotels, theaters, educational institutions
- Another important use of water is for irrigation, like agriculture. Almost 60-70% of the fresh water is used for the irrigation.
- 20-30% of the fresh water is used for the so many industrial operations like refineries, steel, paper and pulp industries.

Over-Utilization of Water (Surface and Ground Water (5 mark)

- The rapid increase in the population and industrial growth has increased the demand for the water resources.
- Due to increase of the ground water usage, the annual extraction of the ground water isfar excess than the natural recharge.

Effects of an over utilization of water (or) Consequences of overdrawing of ground water

- Decrease of ground water - Due to increase usage of ground water level decreases.
- Other reason for decrease of ground water is

a) The erratic and inadequate rainfall results in reduction in storage of water inreservoirs.
b) The building construction activities are sealing the permeable soil zone, reducing the area for percolation of rainwater and increase in surface runoff.

➢ Ground Subsidence

When the groundwater withdrawal is more than its recharge rate, the sediments in the aquifer get compacted, which results in sinking of overlaying land surface. This process is known as ground subsidence.

Problems

1. Structural damage in buildings.
2. Fracture in pipes.
3. Reserving the flow of canals and tidal flooding.

➢ Lowering of Water Table

Over utilization of ground water in arid and semi-arid regions for agriculture disturbs the state of equilibrium of the reservoir in the region. This causes following problems.

Problems

- Lowering of water table.
- Decreased pressure in the aquifers and changes in the speed and direction of water flow.

➢ Instrusion of Salt Water

In coastal area, over-exploitation of ground water would lead to rapid intrusion of saltwater from the sea.

Problem

Water cannot be used for drinking and agriculture.

Earthquake and Landslides

Over-utilization of ground water leads to decrease in water level, which cause earthquake, landslides and famine.

Drying up of Wells

As a result of over utilization of ground water, the level of ground water getting depleted at much faster rates than they can be regenerated. This leads to drying up dug wells as bore wells.

Pollution of Water

When the ground water level near the agricultural land decreases, the water, containing the nitrogen as nitrate fertilizer, percolates rapidly into the ground and pollutes the ground water.

Problem

Water becomes unsuitable for potable use by infants, when nitrate concentration exceeds45 mgs/lit.

Floods Definition

A good is an overflow of water, wherever the magnitude of flow of water exceeds thecarrying capacity of the channel within its banks.

Causes of Floods

- Heavy rainfall, melting of snow
- Over-flowing of lakes and rivers.
- Reduction in the carrying capacity of the channel.
- Deforestation, overgrazing, mining increase the runoff from rains and hence the level offlood rises.

Effects of Floods

- Due to flood, water spreads in the surrounding areas and submerges them.
- Due to floods the plain surface have become eroded and silted with mud and sand, thusthe cultivable land areas gets affected.

Flood Management

- Floods can be controlled by constructing dams or reservoirs.
- Channel management and embankments also control the floods.
- Encroachment of flood ways should be banned.

Drought (5 mark) Definition

Drought is nothing but scarcity of water, which occurs due to inadequate rainfall, latearrival of rains and excessive withdrawal of ground water.

Types of Drought

Droughts are classified into four types

- Meteorological drought.
- Hydrological drought.
- Agricultural drought.
- Socio-economic drought.

Causes of Drought

- When annual rainfall is below normal and less than evaporation, drought is created.
- High population is also another cause for drought. Population growth leads to poor landuse and makes the situation worse.

Effects of Drought

- Drought causes hunger, malnutrition and scarcity of drinking water also changes the quality of water.
- Drought causes widespread crop failures leading to acute shortage of food and adversely affects human and livestock populations.
- The drought indicates the worst situation and initiation of deforestation.

Drought Management

- Rain water harvesting programme is another fruitful method to conserve more water and to control drought.

- To improve ground water level construction of reservoirs are essential in drought area.
- Modern irrigation technology is very much useful to conserve water.
- Afforestation activities also improve the potential of water in drought area.

Conflicts Over Water

- Increase in population and decrease in water resources, conflicts over water starts

Causes of Water Conflicts

- Conflict through use
- International conflicts
- National conflicts
- Construction of dams (OR) Power stations
- Conflict through pollution

Management of Conflicts over Water

1. Efforts are mainly concentrated to enact laws to check these practices to control water pollution.
2. The conflicts over sharing of river water in the country have been studies by many organizations and several solutions are suggested. The interlinking of river has been one such solution.

Big Dams-Benefits and Problems

- Dams are built across the river in order to store water for irrigation, hydroelectricpower generation and flood control.
- Most of the dams are built to serve for more than one purpose called "multipurposedams".

Benefits of Constructing Dams

- Dams are built to control flood and store flood water.
- Sometimes dams are used for diverting part or all of the water from river into a channel.
- Dams are used mainly for drinking and agricultural purposes.
- Dams are built for generating electricity.

- Dams are used for recreational purposes.

1. Upstream Problem

- Displacement of tribal people.
- Loss of non-forest land.
- Loss of forests, flora and fauna.

Problems of Constructing Dams

- Landslips, sedimentation and siltation occur.
- Stagnation and water logging around reservoirs retards plant growth.
- Breeding of vectors and spread of vector-borne diseases.
- Reservoir induced seismicity (RIS) causes earthquakes.

2. Down Stream Problems

- Water logging and salinity due to over irrigation.
- Reduced water flow and slit deposition in rivers.
- Salt water intrusion at river mouth.
- Sometimes, due to structural defects the dam may collapse suddenly and destroy many living organisms.
- Salt water intrusion at river mouth.

Mineral Resources (10 marks)**

Minerals

Minerals are naturally occurring substances having definite chemical composition and physical properties.

Ores

Ores are minerals or combination of minerals from which useful substances, such as metals, can be profitably extracted and used for manufacture.

Classification of Mineral Resources

- Identified resources
- Undiscovered resources
- Reserves

Uses and Exploitation of Minerals (5 marks)*

The important uses of minerals are as follows

- Development of industrial plants and machinery Example: iron, aluminum, copper, etc.
- Construction housing settlements. Example: iron, aluminum, nickel, etc.,
- Generation of energy

Example: coal, lignite, uranium, etc.,

- Designing defense equipment‟s, weapons, ornaments.
- Agricultural purposes, as fertilizers, seed dressings and fungicides Examples: Zineb-containing zinc; maneb- containing manganese.
- Jewelry

Examples: gold, silver, platinum and diamond.

- Making of alloys for various purposes.Example: phosphorites.
- Communication purposes.

Example: Telephone wires, cables, electronic devices.

Table 3.2

Metal	Major World Reserves	Major Uses
Aluminum	Australia, Guinea, Jamaica	Packing food items, transportation.
Chromium	CIS, south Africa	For making high strength steel alloys, in textile/tanning industries.
Copper	U.S.A, Canada, CIS, Chile, Zambia.	Electric and electronic goods, building, construction, vessels
Iron	CIS, South America, Canada,	Heavy machinery, steel production.
Lead	North America, U.S.A, CIS.	Leaded gasoline, car batteries, paints,

- Medical purposes, particularly in Ayurveda system. Example: sulfur pyrites.

Classification of Minerals

Based on Composition

1. Metallic minerals – Ex: Fe, Al, Cu, Zn, etc.
2. Non-metallic materials – Ex: quartz, dolomite, calcite

Based on usage

1. Critical minerals (Economic power) – Ex: Fe, Al, Cu and Au
2. Strategic minerals (Defence of a country) – Ex: Mn, Co, Pt and Cr

Impacts of Extracting and Using Mineral Resources. (10 marks)

Mining

Mining is the process of **extraction of metals** from a mineral deposit. The primary methods used to extract minerals from the ground are:

- Underground mining
- Surface (open pit) mining
- Placer mining

The location and shape of the deposit, strength of the rock, ore grade, mining costs, and current market price of the commodity are some of the determining factors for selecting which mining method to use.

Higher-grade metallic ores found in veins deep under the Earth's surface can be profitably mined using underground methods, which tend to be more expensive. Large tabular-shaped ore bodies or ore bodies lying more than 1,000 feet (300 m) below the surface are generally mined underground as well. The rock is drilled and blasted, then moved to the surface by truck, belt conveyor, or elevator. Once at the surface, the material is sent to a mill to separate the ore from the waste rock.

Lower grade metal ores found closer to the surface can be profitably mined using surface mining methods, which generally cost less than underground methods. Many industrial minerals are also mined this way, as these ores are usually low in value and were deposited at or near the Earth's surface. In a surface mine, hard rock must be drilled and blasted, although some minerals are soft enough to mine without blasting.

Placer mining is used to recover valuable minerals from sediments in present-day river channels, beach sands, or ancient stream deposits. More than half of the world's titanium comes from placer mining of beach dunes and sands. In placer operations, the mined material is washed and sluiced to concentrate the heavier minerals.

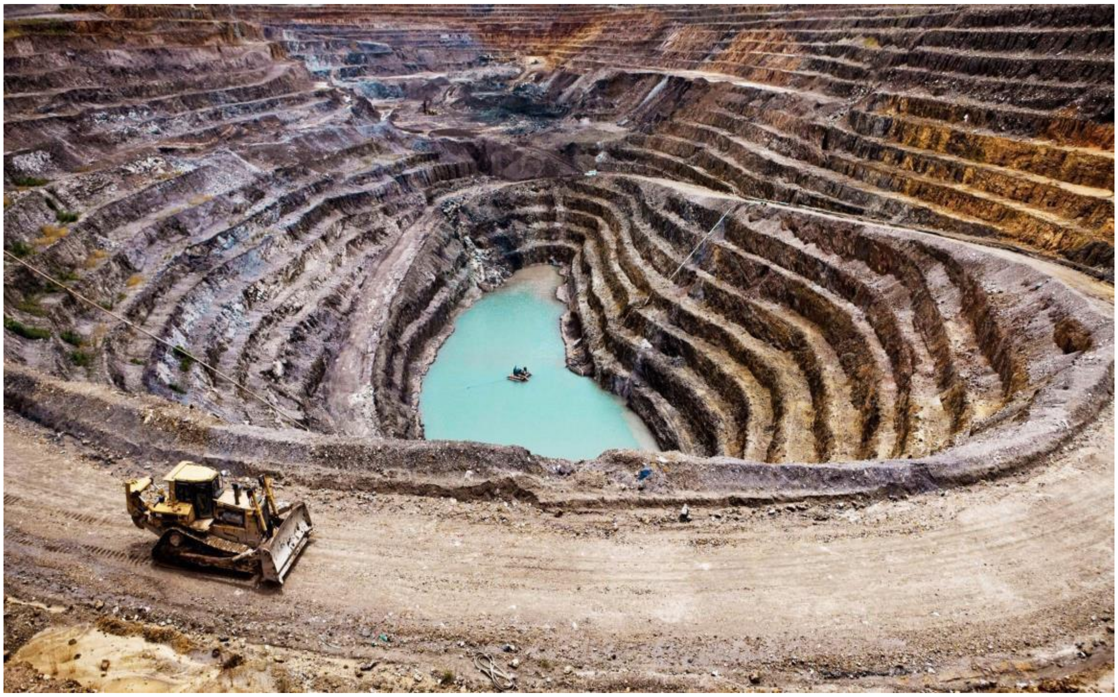


Fig 3.3

Food Resources (10 marks)

Types of Food Supply

- Croplands – Produces grains. Ex: rice wheat, barley, potato etc.,
- Rangelands – Produces food. Ex: meat, milk, fruits, etc.,
- Oceans – Produces food. Ex: fish, prawn, crab, etc.,

Major Food Sources World Food Problems

1. Environmental degradation like soil erosion, water logging, water pollution, salinity, affects agricultural lands.

2. Urbanization is another problem in developing countries, which deteriorates theagricultural lands.
3. Since the food grains like rice, wheat, corn and the vegetable like potato are the majorfood for the people all over the world, the food problem raises.

Under Nutrition and Malnutrition

- Nutritious (or) nutrition (or) nourished
- Under nutrition (or) under nourished
- Malnutrition (or) malnourished

Overgrazing

Overgrazing is a process of,"eating away the forest vegetation without giving it achance to regenerate".

Effect (or) Impacts of Overgrazing

- Land degradation
- Soil erosion
- Loss of useful species

Agriculture

Agriculture is "an art, science and industry of managing the growth of plants andanimals for human".

Types of Agriculture

The two major types of agricultural systems are

- Traditional agriculture.
- Modern agriculture (or) industrialized agriculture.Effects (or) Impacts of Traditional Agriculture
- Deforestation
- Soil erosion
- Loss of nutrients

Modern Agriculture – Effects (or) Impacts of Modern Agriculture (or) Adverse Effects of Agricultural Practices (or) Environmental Effects of Agriculture

1. Problems in using Fertilizer

- Micronutrient Imbalance – Excess of fertilizers ae used in the fields it causesMicronutrient Imbalance
- Blue Baby Syndrome
- When the Nitrogenous fertilizers are applied in the fields, they leach deep into the soiland contaminate the ground water.
- The nitrate concentration in the water gets increased.
- When the nitrate concentration exceeds 25 mg/lit, they cause serious health problem called "Blue Baby Syndrome".

Eutrophication

A large proportion of N, P and K fertilizers is used in crop fields is washed off by the runoff water and reaches the water bodies causing over nourishment of the lakes. This process is known as eutrophication.

2. Problems in using Pesticides (5 mark)

- First generation pesticides
- Second generation pesticides

(a) Death of non-target organisms
(b) Producing new pests
(c) Bio-magnification (d)Risk of cancer

3. Water Logging

Water logging is the land where water stand for most of the year.

Problems in Water Logging

During water-logged conditions, pore-voids in the soil get filled with water and the soil- air gets depleted. In such a condition the roots of the plants do not get adequate air for respiration.

Causes for Water Logging

- Excessive water supply to the croplands.
- Heavy rain.
- Poor damage.

4. Salinity

- The increase in salt content of water is called salinity.

Problems in Salinity

- Most of the water, used for irrigation comes only from canal or ground, which unlike rainwater contains dissolved salts.
- Under dry climates, the water gets evaporated leaving behind the salt in the upper portion of the soil.
- Due to salinity, the soil becomes alkaline and crop yield decreases.

Remedy

- The salt deposit is removed by flushing them out by applying more good quality waterto such soils.
- Using sub-surface drainage system the salt water is flushed out slowly.

Energy Resources (5mark)

Energy

Energy may be defined as, “any property, which can be converted into work”.

(OR)

Energy is defined as, “the capacity to do work”.

Types of Energy Resources

- Renewable energy resources.
- Non-renewable energy resources.

Renewable Energy Resources (or) Non-Conventional Energy Resources

Renewable energy resources are natural resources which can be regenerated continuously and are inexhaustible. They can be used again in an endless manner.

Examples: wood, solar energy, wind energy, hydropower, tidal energy, etc.

Merits of Renewable Energy Resources

- Unlimited supply. -
- Provides energy security.
- Fits into sustainable development concept.
- Reliable and the devices are modular in size.

Non-Renewable Energy Resources (or) Conventional Energy Resources

Non-renewable energy resources are natural resources, which cannot be regenerated once they are exhausted.

They cannot be used again.

Examples: coal, petroleum, natural gas and nuclear fuels.

Renewable Energy Resources Solar Energy

The energy that we get directly from the sun is called solar energy.

Methods of Harvesting Solar Energy

1. Solar Cells (or) Photovoltaic Cells (or) PV Cells

Solar cells consist of a p-type semiconductor and n-type semiconductor. They are in close contact with each other. When the solar rays fall on the top layer of p-type semiconductor, the electrons from the valance band get promoted to the conduction band and cross the p-n junction into n-type semiconductor.

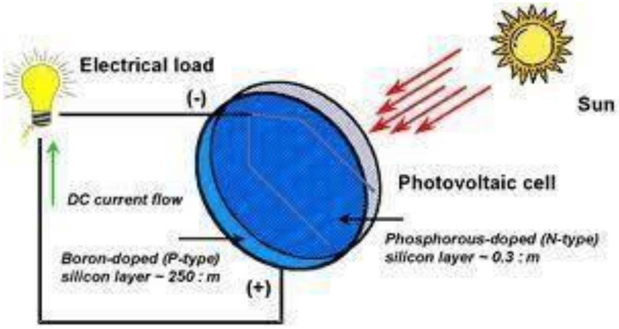

Electrical load
(-)
Sun
Photovoltaic cell
DC current flow
Boron-doped (P-type) silicon layer ~ 250 : m
(+)
Phosphorous-doped (N-type) silicon layer ~ 0.3 : m

Fig 3.4

Solar Battery

When a large number of solar cells are connected in series it forms a solar battery. Solar battery produce more electricity which is enough to run water pump, to run street light, etc., they are used in remote areas where conventional electricity supply is a problem.

2. Solar Heat Collectors

Solar heat collectors consist of natural materials like stones, bricks (or) materials like glass,which can absorb heat during the day time and release it slowly at night.

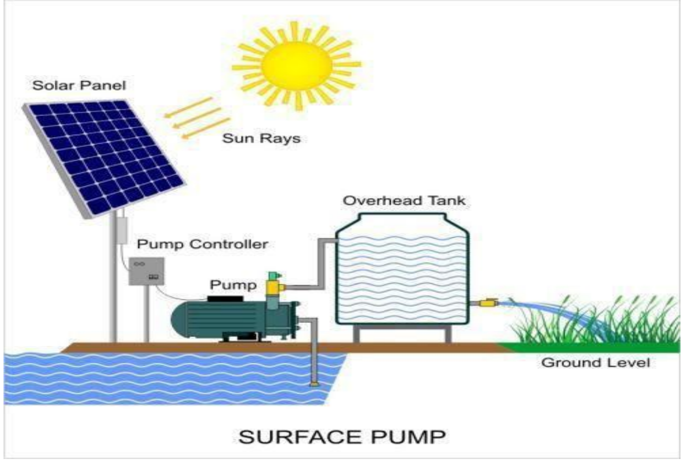


Fig 3.5

3. Solar Water Heater

It consists of an insulated box inside of which is painted with black paint. It is also provided with a glass lid to receive and store solar heat. Inside the box it has a black painted copper coil, through which cold water is allowed to flow in, which gets heated up and flows out into storage tank. From the storage tank water is then supplied through pipes.

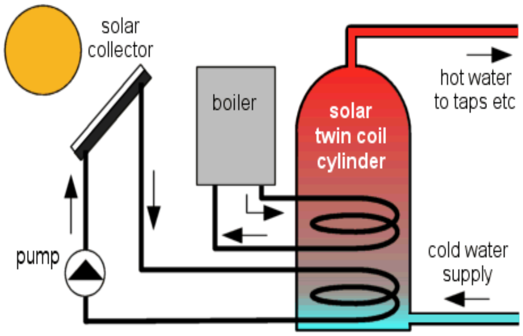


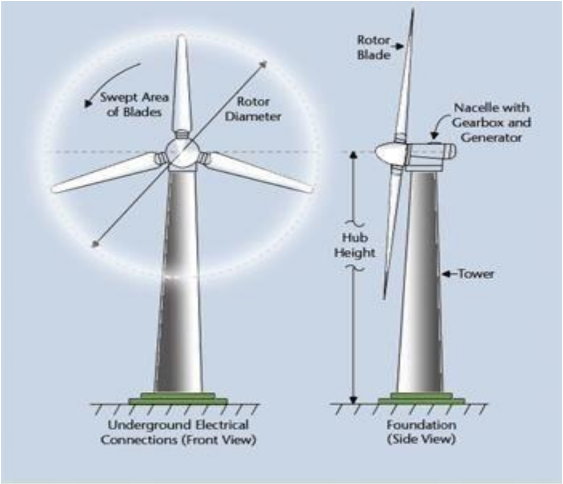
Fig 3.6

Wind Energy

1. Wind Mills

The strike of the blowing wind on the blades of the wind mill makes it rotating continuously. The rotational motion of the blade drives a number of machines like water pump, flour mills and electric generators.

2. Wind Farms



Drawing of the rotor and blades of a wind turbine, courtesy of ESN

Fig 3.7

When a large number of wind mills are installed and joined together in a definite patternit forms a wind farm. The wind farms produce a large amount of electricity.

Advantages

- It does not cause any air pollution.
- It is very cheap.

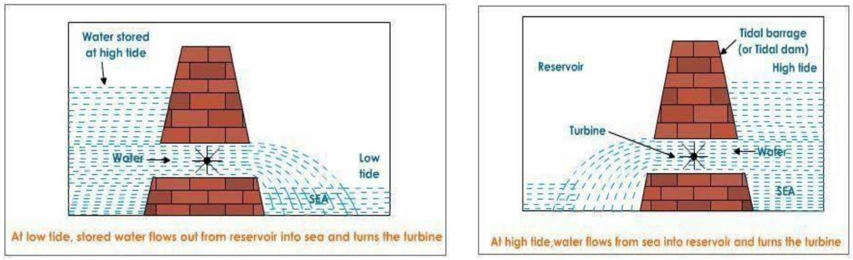
Significance of Wind Energy

- The generation period of wind energy is low and power generation starts from commissioning.
- It is recommended to broaden the nation‟s energy options for few energy sources.

Ocean Energy

Tidal Energy (or) Tidal Power

Ocean tides, produce by gravitational forces of sun and moon, contain enormous amount of energy. The„high tide’ and „low tide’ refer to the rise and fall of water in the oceans. The tidal energy can be harnessed by constructing a tidal barrage.



At low tide, stored water flows out from reservoir into sea and turns the turbine

At high tide,water flows from sea into reservoir and turns the turbine

Fig 3.8

Ocean Thermal Energy (OTE)

There is often large temperature difference between the surface level and deeper level of the tropical oceans. This temperature difference can be utilized to generate electricity. The energy available due to difference in temperature of water is called ocean thermal energy.

Condition

The temperature difference should be of 200 C or more is required between surface waterand deeper water.

Significance of OTE

- OTE is continuous, renewable and pollution free.
- The use of cold deep water, as the chiller fluid in air-conditioning, has also been proposed.

Geo-Thermal Energy

Temperature of the earth increases at a rate of 20-75o C per km, when we move down the earth surface.

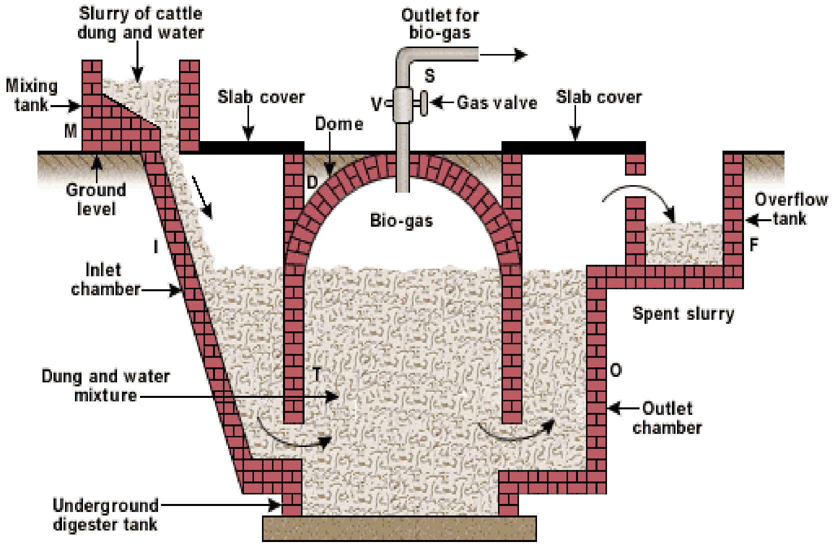
High temperature and high pressure steam fields exist below the earth's surface in many places.

Biomass Energy

Biomass is the organic matter, produced by plants or animals, used as sources ofenergy. Most of the biomass is burned directly for heating, cooling and industrial purposes.

1. Biogas

Biogas is a mixture of gases such as methane, carbon dioxide, hydrogensulphide, etc., It contains about 65% of methane gas as a major constituent.



Fixed-dome type bio-gas plant.

Fig 3.9

2. Biofuels

Biofuels are the fuels, obtained by the fermentation of biomass.Example: Ethanol, methanol.

3. Hydrogen Fuel

Hydrogen can be produced by thermal dissociation or photolysis of water. It possesses high calorific value. It is non polluting, because the combustion product is water.

Disadvantages of Hydrogen Fuel

- Hydrogen is highly inflammable and explosive in nature.
- Safe handling is required.
- It is difficult to store and transport.

Significance of Biomass Energy

- Biomass consumes more carbon dioxide than is released during combustion of biomass.
- It provides a stored form of energy and in many cases in a form of suitable for vehicle propulsion.

Non-Renewable Energy Resources (5 mark)

Coal

Coal is a solid fossil fuel formed in several stages as buried remains of land plants the lived 300-400 million years ago were subjected to intense heat and pressure over millions of years.

Disadvantages of Coal

- When the coal is burnt it produces carbon dioxide, causes global warming.
- Since coal contains impurities like S and N, it produces toxic gases during burning.

Petroleum

Petroleum or crude oil is a thick liquid consisting of more than hundreds of combustible hydrocarbons with small amount of S, O, N as impurities.

LPG (Liquefied petroleum gas)

The petroleum gas, obtained during the cracking and fractional distillation, can be easily converted into liquid under high pressure as LPG.

Natural Gas

Natural gas is found above the oil in oil well. It is a mixture of 50-90% methane and small amount of other hydrocarbons. Its calorific value ranges from 12,000-14,000 k.cal/meter cubes.

Nuclear Energy

- The energy comes from the nucleus is called Nuclear Energy

- By nuclear fission.
- By nuclear fission.

Nuclear Fission

Nuclear fission is a nuclear change in which heavier nucleus are split into lighter nuclei, on bombardment by fast moving electrons. Example: Fission of U235.

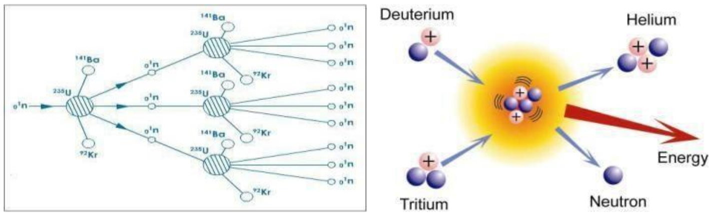


Fig 3.10

Nuclear Fusion

Nuclear fusion is a nuclear change in which lighter nucleuses are combined together at extremely high temperature to form heavier nucleus and a large amount of energy released.

Example: Fusion of H2 bomb

Table 3.3 Comparison of Coal Power with Nuclear Power (Advantages and Limitations)

S .No.	Coal power	Nuclear power
1.	Coal is called a fossil fuel. It is formed from the remain of plants and animals for over a million of year.	Nuclear power is generated either from nuclear fission or fusion reaction
2.	Coal power produces about 90% of world‟s total energy developments	Nuclear power produces around 11% of world‟s energy needs
3.	Much smaller energy changes involved during the combustion of Coal	The energy changes involved is many milliontimes greater.

Land Resources (5 mark)**

Land as a Resource

Land is the most important and valuable resources for mankind as it provide food, fiber, wood, medicine and other biological materials for food.

Uses of Land Resources

- Land provides food, wood, minerals, etc., for us.
- Land nature the plants and animals that provide our food and shelter.

Land (Soil) Degradation

Land degradation is the process of deterioration of soil or loss of fertility of the soil.

Harmful Effects of Land (Soil) Degradation

- The soil texture and soil structure are deteriorated.
- Loss of soil fertility, due to loss of invaluable nutrients.

Causes of (or Factors Influencing) Land Degradation

- Population
- Urbanization
- Fertilizers and pesticides
- Damage of top soil

Soil Erosion (5 mark)

Soil erosion is the process of removal of superficial layer of the soil from one place toanother. Soil erosion also removes the soil components and surface litre.

Types of Soil Erosion

- Normal erosion
- Accelerated erosion

Human Effects of Soil Erosion

- Soil fertility is lost because of loss of top soil layer.
- Loss of its ability to hold water and sediment.

Causes of Soil Erosion

- Water - Water affects soil erosion in the form of rain, run-off, rapid flow, wave action.
- Wind - Wind is the important climate agent, who carry away the fine particles of soil and creates soil erosion.
- Biotic-agents - Overgrazing, mining and deforestation are the major agents, cause soil erosion.

Control of Soil Erosion (or) Soil Conservation Practices (5mark)

Conservational till Farming (or) No-till Farming

In tradition method, the land is ploughed and soil is broken up and leveled to make a planting surface. This disturbs the soil and makes it susceptible to erosion.

Fig 3.11

➢ Contour Farming

It involves planting **crops on rows gently sloped** land. Each row acts a small dam tohold soil and to slow water runoff.

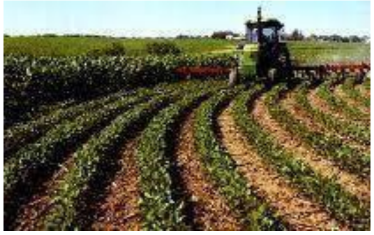


Fig 3.12

➢ Terracing

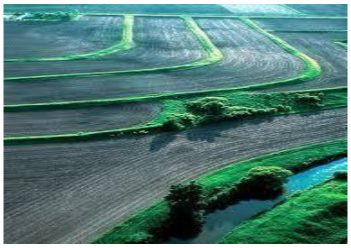


Fig 3.13

It involves conversion of steep slopes into a series of broad terraces, which run acrossthe contour. This retains water for crops and reduces soil erosion by controlling run off.

➢ Alley Cropping (or) Agro Forestry

It involves planting crops in strips or alleys between rows of trees of shrubs that canprovide fruits and fuel food.

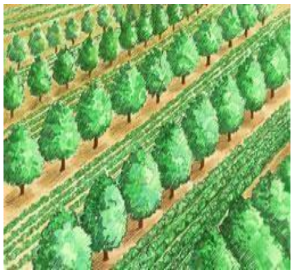


Fig 3.14

- **Wind Breaks or Shelter Belts**

The trees are planted in long rows along the boundary of cultivated lands, which block the wind and reduce soil erosion.

Desertification (5mark)

Desertification is progressive destruction or degradation of arid or semiarid lands to desert.

Harmful Effect of Desertification

- Around 80% of the productive land in the arid and semi-arid regions is converted intodesert.
- Around 600 million people are threatened by desertification.

Causes of Desertification (or) Reasons for Desertification

- Deforestation
- Over grazing
- Mining and quarrying
- Climate change
- Pollution

Landslides

Landslides are the downward and outward movement of a slope composed of earth materials such as rock, soil, artificial fills.

Harmful effect of Landslides

- Landslides increase the turbidity of nearby streams, thereby reducing their productivity.
- Destruction of communication links.

Causes of Landslides

- Removal of Vegetation - Deforestation in the sloppy area create soil erosion, which leads to landslides.
- Underground Mining - These activities cause subsidence of the ground.

- Transport: Due to the movement of buses and trains in the unstable sloppy regioncauses landslides.
- Addition of Weight - Addition of extra weight (or) construction on the slope areas
- Ground Water Level - Over exploitation of ground water also leads to landslides.

Role of Individual In Conservation of Natural Resources (10 marks)*

1. Conservation of Energy

- Switch off lights, fans and other appliances when not in use.
- Use solar heater for cooking your food on sunny days, which will cut down your LPG expenses.
- Dry the clothes in sunlight instead of driers.

2. Conservation of Water

- Use minimum water for all domestic purposes.
- Check for water leaks in pipes and toilets and repair them promptly.
- Reuse the soapy water, after washing clothes, for washing off the courtyard, etc.,

3. Conservation of Soil

- Grow different types of plants, herbs, trees and grass in your garden and open areas.
- While constructing the house don't uproot the trees as far as possible.
- Don‟t irrigate the plants using a strong flow of water, as it will wash off the top soil.
- Soil erosion can be prevented by the use of sprinkling irrigation.

4. Conservation of Food Resource

- Eat only minimum amount of food. Avoid over eating.
- Doesn't waste the food instead give it to someone before getting spoiled
- Cook only required amount of food.
- Don‟t cook food unnecessarily.

5. Conservation of Forest

- Use non-timber products.
- Plant more trees and protect them.
- Grassing, fishing must be controlled.

Chapter-IV Biodiversity and Conservation

Biodiversity and Conservation

- Levels of biological diversity: genetics, species and ecosystem diversity, Biogeographic zones of India: Biodiversity patterns and global biodiversity hot spots India as a mega- biodiversity nation, Endangered and endemic species of India.
- Threats to biodiversity: Habitat loss, poaching of wildlife, man- wildlife conflicts, biological invasions; Conservations of biodiversity: In-situ and Ex-situ Conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Biodiversity at Global level (10 marks)**

- ➢ Total numbers of living species in the world are about 20 Million.
- ➢ About 1.5 Million species are found and given scientific names.
- ➢ Tropical deforestation alone is reducing the biodiversity by 0.5 % every year.

1. Terrestrial biodiversity / Biomass

➢ It is largest ecological units present in different geographic (land) area. Ex: Tropicalrain Forrest, Savannas, Desert, etc.,

➢ **Tropical rain Forrest –** these are the earth's largest store house of biodiversity. Ex:Species of plants, Insects, Birds and Mammals.

➢ **Medicinal Plants –** more than 25 % of the drugs are extracted from plants growing intropical Forrest.

➢ **Flowering Plants –** It has been estimated that nearly 1,30,000 flowering plant speciesare found available, till now we know only 1-3 %.

➢ **Temperate Forest –** these have much less biodiversity. Globally they have nearly

Table 4.1

Flowering Plants	1,70,000
Vertebrates	30,000
Other group of species	2,50,000

2. Marine biodiversity

- Marine (water) diversity is much higher than Terrestrial biodiversity.

Table 4.2

Name of the Species	**Number**
Protozoans	31,000
Bacteria	5,000
Algae	27,000

Name of the Species	**Number**
Sponges	5,000
Insects	7,50,000
Snails, Sludge	70,000

Biodiversity at National level (India)

- India is second largest nation containing 5 % of world's biodiversity and 2% of earthsurface.

Table 4.3 Rank of India in biodiversity

Plant rich Countries	10th Rank
Endemic species	11th Rank
Agriculture crops	6th Rank

Medicinal Value

More than 2,000 medicinal plants are cultivated in India, which cancure many diseases. Ex: Tulsi, Neem, Turmeric, etc.,

Commercial value

Indian sandal wood has high commercial value, Indian tobacco hashigh nicotine content and more than 100 species of microorganisms were collected from Indian soils.

Table 4.4 Number of plant and animal species in India are following

Group	Number of Species
Flowering Plants	20,000
Insects	67,000
Fishes	1,460
Birds	1,200
Reptiles	420
Mammals	340
Domesticated animals and plants	170

Biodiversity at Local level

- ➢ Based on their spatial distribution it is classified 4 types

Table 4.5

1	Point Richness	Number of Species that can be found at a single point in a given space
2	α-richness (or) Alpha biodiversity	Number of Species found in a small homogeneous area
3	β-richness (or) Beta biodiversity	The rate of change in species composition across different habitats.
4	γ-richness (or) Gamma biodiversity	The rate of change across large landscape

India as a Mega-Diversity Nation (5mark)

- ➢ India is one among the 12 mega- diversity countries in the world.
- ➢ It has 89,450 animal species for 7.31% of the global faunal species and 47,000plant species which accounts for 10.8% of the world floral species.
- ➢ The loss of biodiversity is about 33%.

Table 4.6 Distribution of species in some groups

Plants	Number	Animals	Number
Fungi	23,000	Arthropod	57,525
Bacteria	850	Birds	1228
Algae	2500	Reptiles	428

➢ Endemism (or) Endemic species

It is defined as "the species which are confined to a **particular area** arecalled endemic species".

Examples

1. Plant diversity

- ➢ Nearly 5000 flowering plants and 166 crop plant species have their origin in India.

2. Marine diversity

- ➢ More than 340 coral species of the world are found here.
- ➢ Several species of mangrove plants and seagrases are also found in our country.

3. Agro-biodiversity

- ➢ There are 167 crop species and wild relatives.
- ➢ India is considered to be the centre of origin of 30,000 to 50,000 varieties of rice, mango, turmeric, ginger, sugarcane, etc.

4. Animal biodiversity

- ➢ There are 75,000 animal species including 5,000 insects.
- ➢ India is a home to about nearly 2, 00,000 living organisms.

RED Data book (or) RED List

- ➢ Red book is a catalogue of taxa facing risk of extinction.
- ➢ The purpose of preparation of red list is to.

1. Provide awareness.
2. Provide global index.
3. Identification of species.
4. Information about international agreements.

Hot – Spots of Biodiversity (5mark)

- The hot spots are the geographic areas which possess high endemic species.

Criteria for recognizing hot spots

- The richness of the endemic species is the primary criterion for recognizing hot spots.
- The hot spots should have a significant percentage of specialized species.
- The site is under threat.

Reason for rich biodiversity in the tropics

- The tropics have a more stable climate.
- Warm temperature and high humidity
- Among plants rate of out-crossing appear to be higher in tropics.

Table 4.7 Biodiversity hot spots in India

1.	**Eastern Himalayas**	Indo-Burma region
2.	**Western Ghats**	Srilanka region.

Eastern Himalayas

- Geographically this area comprises Nepal, Bhutan and neighboring states ofnorthern India.
- There are 35,000 plant species found in the Himalayas, of which 30% are endemic.
- The eastern Himalayas are also rich in wild plants of economicvalue. Examples: Rice, banana, citrus, ginger, chili, jute andsugarcane.
- 63% mammals are from easternHimalayas.
- 60% of the Indian birds are from northeast.

Western ghats

- The area comprises Maharashtra, Karnataka, Tamilnadu and Kerala.
- Nearly 1500 endemic, dicotyledonous plants species are found from Western Ghats.
- 62% amphibians and 50% lizards are endemic in Western Ghats.

Some common plants

Ternstroemia, Japonica, Rhododendron and Hypericium.

Some common animals

Blue bird, Lizard, Hawk.

Endangered and Endemic Species of India

According to International Union of Conservation of Nature and Natural Resources (IUCN) the species are classified into various types.

- Extinct species.
- Endangered species.
- Vulnerable species.
- Rare species.

1. Endangered Species Of India(5 mark)

- A Species is said to be endangered, when its number has been reduced to a critical level.
- Unless it is protected and conserved, it is in immediate danger of extinction.

Table 4.8

Groups of Threatened Species	No of Threatened Species
Plants	250
Birds	70
Mammals	86
Reptiles	25
Amphibians	3
Fishes	3
Mollusks	2
Insects	50

Table 4.9 Important endangered species

1.	Reptiles	Tortoise, green sea turtle, gharial, python.
2.	Mammals	Indian wolf, red fox, sloth bear, tiger, Indian lion.
3.	Primates	Hoolock gibbon ,lion-tailed macaque.
4.	Plants	A large number of medicinal plants like rauvol fia serpentia.

Red – data book

- RED –data book contains the list of endangered species of plants and animals
- The red –data gives the warning signal for those species which areendangered and if not protected they become extinct in near future.

Factors affecting endangered species

- Pollution
- Over-exploitation
- Climate change

2. Endemic species

The species which are found only in a particular region are known asendemic species.

1. Fauna

- Animals present in a particular region orperiod. Examples:
- Saparia himalayana, ovaria lurida, nepenthes khasiama.

2. Flora

- Plants present in a particular region orperiod. Examples:
- Monitor lizards, reticulated python, Indian salamander and viviparous.

Table 4.10 Endemic Species of Plants

Groups	**No. of Species**
Pteridophyta	200
Angiosperms	4950

Table 4.11 Endemic Species of Animals

Group	**No .of Species**
Land	878
Fresh Water	89
Insecta	16214
Amphibia	110
Reptilia	214
Aves	69
Nannakua	38

Factors Affecting Endemic Species

- Habitat loss and fragmentation, because of the draining and filling ofinland wetlands.
- Pollution also plays animportant role.

(or)

Endangered & Endemic Species Of India

Species are classified into various types:

Extinct species → No longer found in the world

Endangered species → A species is said to be endangered when its no has been reduced to a critical level.

Unless it is protected it is in danger of extinction.

Vulnerable species → when its population is facing continuous decline due to habitat loss.

Rare species → when it is localized within restricted area.

Endangered Species Of India

A species is said to be endangered when its no has been reduced to a critical level. Unless it is protected it is in danger of extinction

Table 4.12 No of threatened species of India

Plants	250
Birds	70
Mammals	86
Reptiles	25
Amphibians	3
Fishes	3
Molluscs	2, Insects -50

Important Endangered Species

Reptiles → Tortoise, green sea turtle, gharial, python
Birds → Peacock, Siberian white crane, pelican, Indian Bustard
Mammals → Indian wolf, red fox, tiger, Indian lion, golden cat, desert cat. Primates → liontailed monkey, capped monkey, golden monkey
Plants → medicinal plants, sandal wood tree

RED-data Book = Data book which contains the list of endangered species of plants andanimals.

Factors affecting Endangered Species

- *Pollution:* Human disposal in nature. Travel through food chain and leads to death
- *Over-exploitation*: over usage of natural resources & poaching leads to extinct of wildlife
- *Climatechange*: ozone depletion, flood etc, threatens organisms and ecosystem

Remedial Measures

- CITES – Convention on International Trade in Endangered Species is signed
- 2900 and other 900 endangered species are restricted for trade.

Endemic Species

The species, which are found only in a particular region are known as endemic species.62% of endemic species are found in Himalayas and Western Ghats

Fauna

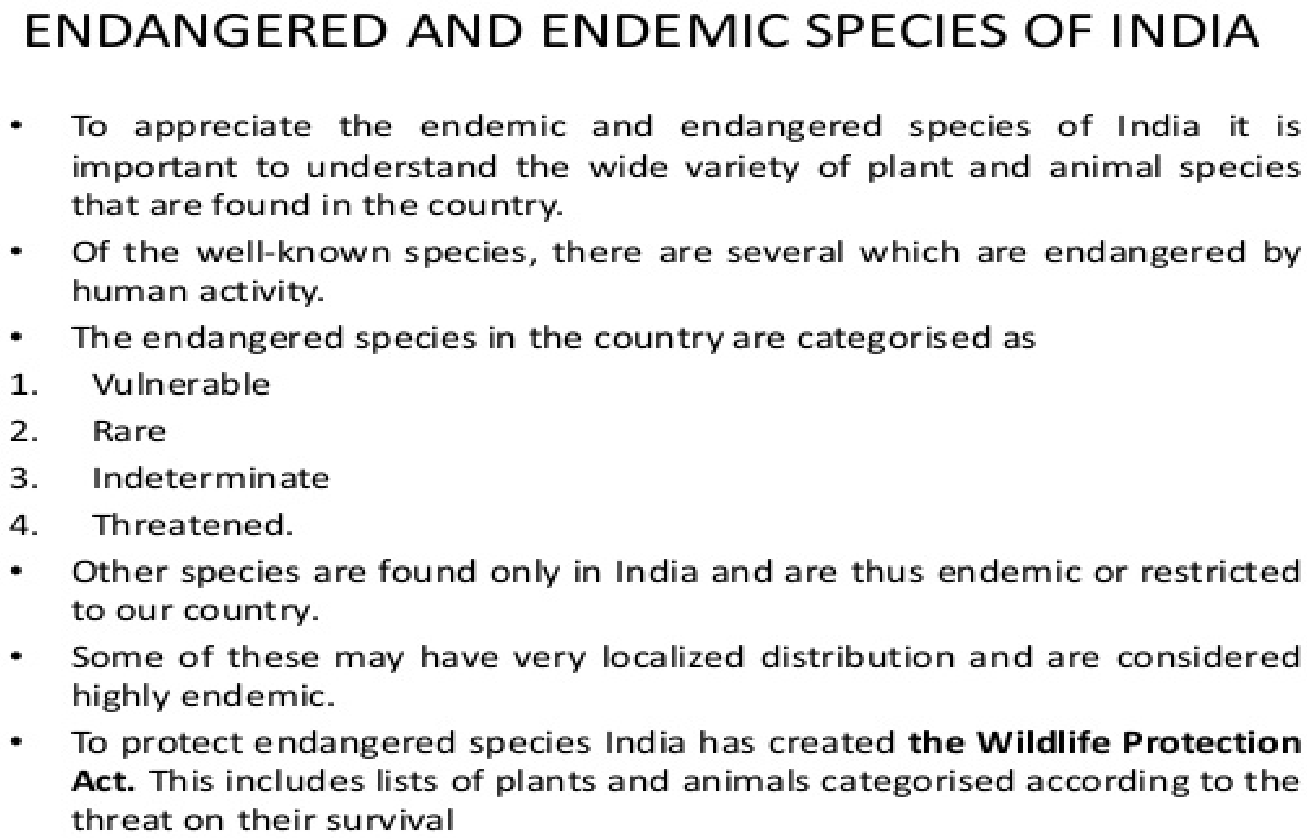
Animals present in a particular region or period is Fauna.

62% amphibians & 50% lizards are endemic to Western Ghats.

(ex) Monitor lizards, reticulated python, Indian salamander, viviparous toad.

Plants present in a particular region or period is Flora

(ex) Sapria himalayana, ovaria lurida, pteridophyta, angiosperms etc.



ENDANGERED AND ENDEMIC SPECIES OF INDIA

- To appreciate the endemic and endangered species of India it is important to understand the wide variety of plant and animal species that are found in the country.
- Of the well-known species, there are several which are endangered by human activity.
- The endangered species in the country are categorised as

1. Vulnerable
2. Rare
3. Indeterminate
4. Threatened.

- Other species are found only in India and are thus endemic or restricted to our country.
- Some of these may have very localized distribution and are considered highly endemic.
- To protect endangered species India has created **the Wildlife Protection Act.** This includes lists of plants and animals categorised according to the threat on their survival

Fig 4.1

Flora

Factors affecting endemic species

Habitat loss, fragmentation, pollution

Conservation of Biodiversity (10marks)***

Conservation – Definition

- The management of biosphere so that it will yield the greatest sustainable benefit to present generation
while maintaining its potential to meet the needs of future generation.

Factors affecting Biodiversity

- Biodiversity is generally disturbed by human activities such as construction of dams in forest areas, release of industrials waste, using pesticides and insecticides in the crop fields, urbanization, etc.
- Poaching of wild animals, over exploitation of natural resources, degradation of habitats affect biodiversity.
- The marine ecosystem are also disturbed due to oil spills and discharge of effluents,
- The climate factors like global warming, ozone depletion, acid rain also affectthe biodiversity.

Advantages (or) need of biodiversity conservation

- It provides immediate benefits to the society such as recreation and tourism
- Drugs, herbs, food and other important raw materials can be derived from plants andanimals.
- It also preserves the generate diversity of plants and animals.
- It leads to conservation of essential ecological diversity and life supporting system.

Types of Biodiversity Conservation

1. In-Situ conservation (within habitat)
2. Ex-Situ conservation (outside habitat)

1. In –Situ Conservation

- In –Situ conservation involves protection of fauna and flora within its natural habitat, where the species normally occurs is called in-situ conservation.
- The natural habitats or ecosystem maintained under in-situ conservation are called “protected areas”

➢ Important In-Situ Conservation - Biosphere reserves, National parks, Wildlife sanctuaries, Gene sanctuary etc.

Table 4.13 Methods of in- situ conservation

In –Situ Conservation	**Numbers Available**
Biosphere reserves	7
National parks	80
Wild-life sanctuaries	420
Botanical gardens	120

1. Biosphere reserves

- Biosphere reserves cover large area, more than 5000 sq.km.
- It is used to protect species for long time.

Table 4.13

Name of Biosphere	**State**
Nanda devi	U.P
Nokrek	Meghalaya
Manas	Assam

2. National park

- A national park is an area dedicated for the conservation of wildlife along with its environment.

Table 4.14

Name of National Park	**State**	**Important Wildlife**
Periyar	Kerala	Tiger, Elephant
Gir national park	Gujarat	Indian lion
Bandipur	Karnataka	Elephant
Dachigam	J&K	Hangul

3. Wildlife sanctuaries

- A wildlife is an area , which is reserved for the conservation of animals only
- At present there are 492 wildlife sanctuaries in our country.

Table 4.15

Name of Sanctuary	State	Major Wild Life
Mudumalai	Tamilnadu	Tiger, Elephant ,leopard
Vedanthangal	Tamilnadu	Water birds
Sultanpur bird	Haryana	Migratory birds

4. Gene sanctuary

- A gene sanctuary is an area, where the plants are conserved.

Examples

- In northern India ,two gene sanctuary are found available

a) One gene sanctuary for citrus (Lemon family)

b) One gene sanctuary for pitcher plant (an insect eating plant).

5. Other projects for conservation of animals

- For the protection and conservation of certain animals, some special projectsare framed in our country.

Examples: Project Tiger; Gir Lion Project; Crocodile Breeding Project.

Advantages

- It is very cheap and convenenient method.
- The species gets adjusted to the natural disasters like drought, floods, forest.Disadvantage
- A large surface area of earth is required to preserve the biodiversity.
- Maintenance of habitats is not proper, due to shortage of staff and pollution.

2. Ex-situ conservation

- Ex-Situ conservation involves protection of fauna and flora outside the natural habitats.

Role of Ex-situ conservation

- It involves maintain and breeding of endangered plant and animal species under controlled conditions.
- It identifies those species, which are more important to extinction.
- It prefers the species, which are more important to man in near future among theendangered species.

Important Ex-situ conservation

- Botanical gardens, seed banks, microbial culture collections, tissue and cell cultures, musems zoological gardens.

Methods of ex-situ conservation

- National Bureau of Plant Genetic Resources (NBPGR)
- National Bureau of Animal Genetic Resources (NBAGR)
- National Facility for Plant Tissue Culture Repository (NFPTCR)

Advantages

- Survival of endangered species is increasing due tp special care and attention.
- In captive breeding, animals are assured food, water, shelter and also security and hence longer life span.

Disadvantage

- It is expensive method
- The freedom of wildlife is lost
- The animals cannot survive in natural environment. (or)

Conservation Of Biodiversity

Definition

The management of biosphere for the sustainable benefit to meet the needs of future generation.

Factors affecting biodiversity

- Human activities like construction of dams in forest, industrial wastes, using pesticides etc
- Poaching of wild animals, over exploitation of natural resources.
- Discharge of effluents disturbs the marine ecosystem
- The climatic factors-global warming, ozone depletion, acid rain affect the biodiversity

Advantages or Need of Biodiversity

- Recreation, tourism, Drugs, herbs, food, important raw materials, preserves plants & animals, hence leads to life supporting systems.

Types of Biodiversity

In-situ conservation (within habitat) Ex-situ conservation (outside habitat)

In-Situ Conservation

Involves protection of fauna & flora within its natural habitat.

Methods of In-Situ conservation

Biosphere reserves	7
National Parks	80
Willife sanctuaries	420
Gene sanctuaries	120

1. Biosphere Reserves

Covers area of more than 5000 sq. km.

Protect species for long time

(ex) Nanda devi - U.P
Nokrek - Meghalaya
Nilgiri - Kerala, TN, Karnataka

Manas - Assam
Sunderbans - West Bengal
Gulf of Mannar - TN

Role of Bioshpere reserves

Protects endangered species Site of recreation & tourism

Useful for education & research purpose Gives long term survival

2. National Park

Covers area of about 100 to 500 sq.kms Conserves wildlife & environment

(ex) Gir National Park	Gujarat
Periyar	Kerala
Dudwa	UP
Sariska	Rajasthan
Ranthambore	Rajasthan
Kaziranga	Assam

Role of National Park

For tourism without affecting environment Protect, propagate & develop wild life

Restrictions

4. Gene Sanctuary

Restriction: ll it Consserve Plasnts iti ti s No tourism & explosives are permitted.

Grazing of dome canima prohibied

A private right & forestry acvi eareprohibited.

3. Wildlife Sanctuaries

Conserve animals & Birds only

Examples:
Mudumalai wildlife sanctuary –TN Vedanthangal Bird sanctuary- TN Sultanpur Bird sanctuary- Haryana Ghana Bird sanctuary- Rajasthan Wild Ass sanctuary-Gurajat

Role of wildlife Sanctuaries

Protects animals only Harvesting of timber, Collection of forest products

Examples:
Citrus sanctuary – North IndiaPitcher plant -North India

5. Other Projects for conservation of animals

Examples:
Gir Lion Project, Crocodile Breeding Project, Project Elephant, Project Tiger etc.

Merits of In-situ conservation

- Very cheap & convenient method
- Species adjust to floods, drought, forest fires etc.

Demerits

- Large area is needed, Maintenance is not proper due to pollution and lack of staff.

Restrictions

Killing, hunting, shooting of wildlife is prohibited

Ex-Situ Conservation

Involves protection of fauna & flora outside the natural habitats.

Role of Ex-situ conservation

Maintenance of endangered plant & animal species under controlled conditions Preserves more important species

Methods of Ex-situ conservation

1. NBPGR

- National Bureau of Plant Genetic Resources → uses cryo technique
- Cryo Technique: Preservation of seeds, vegetables, fruits, crops, etc by using liquid nitrogen at -196º C

2. NBAGR

- National Burea of Animal Genetic Resources → preserves semen of bovine animals.

3. NFPRCR

National Facility for Plants Tissue Culture Respository → preserves crops or trees by tissue culture

Merits

Survival / life span of species increase by special care Species are assured for food, water, shelter etc Endangered species are preserved

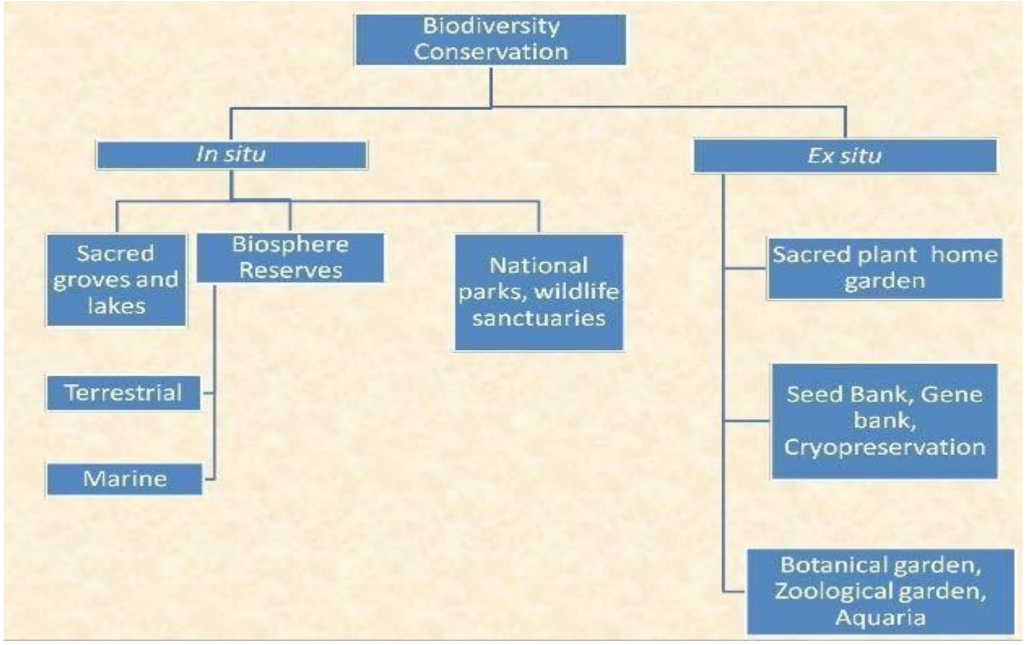

Biodiversity Conservation
In situ
Ex situ
Sacred groves and lakes
Biosphere Reserves
National parks, wildlife sanctuaries
Terrestrial
Marine
Sacred plant home garden
Seed Bank, Gene bank, Cryopreservation
Botanical garden, Zoological garden, Aquaria

Fig 4.2

Demerits

Expensive method Freedom of wildlife is lost Animal cant survive in natural environment

Threats to Biodiversity (10marks)***

- Any disturbance in an natural ecosystem tend to reduce its biodiversity.

Causes for Loss of Biodiversity (or) Various Threats toIndian Biodiversity

1. Habitat Loss

- The loss of populations of inter breeding organisms is caused by habitat loss.
- Habitat loss threatened a wide range of animals and plants.

Factors influencing habitat loss

- Deforestation
- Destruction of wetlands.
- Habitat fragmentation.
- Production of drugs.
- Illegal trade.
- Developmental activities,

2. Poaching of wildlife (Killing of animals / Commercial Hunting of wild animals)

- **Subsistence poaching** - Killing of animals toprovide enough food.
- **Commercial poaching** – Hunting andKilling of animals to sell their products.

Factors influencing poaching

- Human population.
- Commercial activities.

(or)

Threats To Biodiversity

Any disturbance in a natural ecosystem tends to reduce its biodiversity. Various threats to biodiversity are:

1. Habitat Loss

Loss of population of interbreeding organism.

Factors influencing Habitat Loss: Deforestation

Forest & grasslands are cleared for agricultural lands or developmental projects. Many species disintegrate due to loss of natural habitat.

Destruction of wetlands

Wetlands are destroyed due to pollution, draining etc.

3. Man –wildlife conflicts

- Man – wildlife conflicts arise, when wildlife starts causing immense damage and danger to the man.
- Under such condition it is very difficult for the forest department tocompromise the affected villagers and to gainthe villagers support for wildlife conservation.

Factors influencing man-animal conflicts

- Shrinkage of forest cover compelswildlife to move outside the forest and attack the fields and humans.
- Human encroachment into the forestarea induces a conflict between man and wildlife.
- Injured animals have a tendency to attack man.

Remedial measures (or) conservation of biodiversity

- Adequate crop and cattle compensation schemes must be started.
- Solar powered fencing must be provided along with electric current proof trenches to prevent the animals from entering into the fields.
- Cropping pattern should be changednear the forest borders.

Habitat fragmentation

Habitat is divided into small & scattered o, many animal & birds are vanishing.

Raw materials

For the production of hybrid seeds, wild plants are used as raw materials.

Production of Drugs

Pharmaceutical companies collect wild plants for drugs production. So, no of medicinal plants are on the verge of extinction.

Illegal Trade

Trade on wild life reduces bio-diversity

Man-wildlife Conflicts: examples

Sambalpur – orissa: 195 humans were killed by
Kote – Chamrajanagar –Mysore: Sugarcane & cotton crop, explosives
Royal Chitwan National Park – Kathmandu: Man-eating tiger killed 16 nepalese, 4 yrs child
Sanjay Gandhi National Park – Mumbai: Leopards killed– 14 persons

Poaching

Killing / Hunting of animals is poaching.

Types

Subsistence Poaching- killing animals for surviving.

Commercial Poaching- hunting animals for selling

Factors influencing Poaching

- *Human Population:* increase in population increases pressure on forest resources.
- *Commercial activities:* Smuggling of wild life products for high profit.

- *Wildlife products*=Furs, horns, tusk, live specimen, herbal products.
- *Importers of wild life* = Europe, North America, Japan, Taiwan, Hong Kong

Examples

- Male gorilla for its body parts
- Blue morpho butterfly – making attractive trays Snowy large egret – used for white feather in ladieshat.US Elephant feet – for making Ash traysElephant – for ivory
- Bengal tiger – soled for $1,00,000 in foreign market
- Dynamite fishing – high tech fishing, exhaust marine life, Sea horses, Sea turtles

Factors Influencing man-animal conflicts

1. Shrinking of forest compels wildlife to move outside the forest
2. Electric wiring around crops
3. Animals suffer pain and attack humans
4. Female wildlife attack human more to safe its cubs.
5. Forest dept. don't cultivate foods for wild
6. Cash compenstn by Govt – 400/- per quintalBut market price 2400/-
7. Garbage near human settlement attract wild

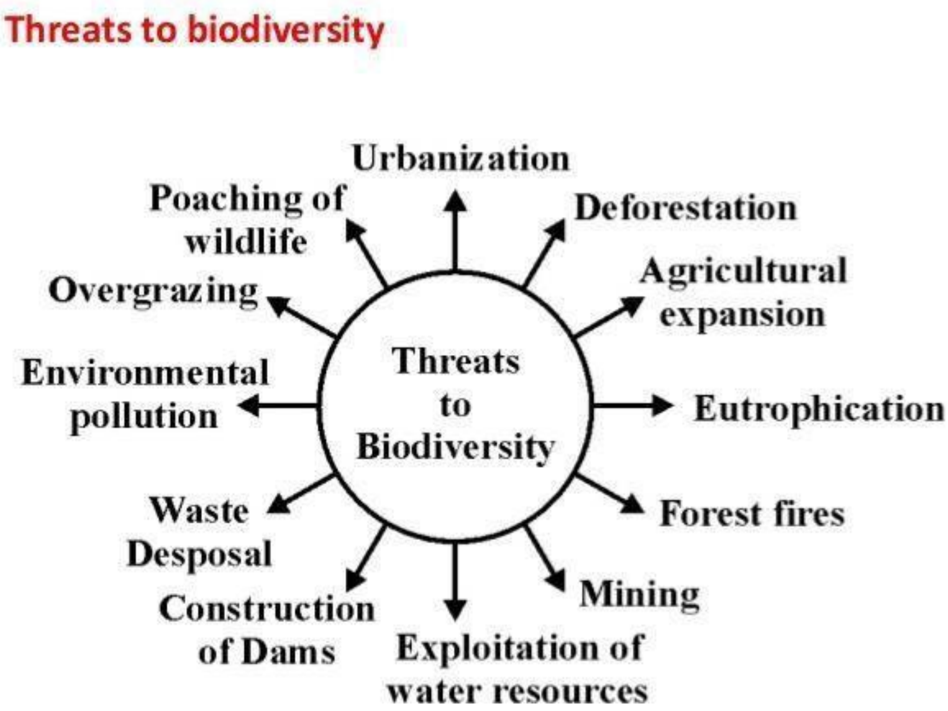


Fig 4.3

Chapter-V Environmental Pollution

Environmental Pollution

- Environmental pollution: types, causes, effects and controls: Air, Water, soil and noise Pollution.
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste
- Pollution case studies.

Environmental Pollution

Pollution is defined as the unfavorable alternation of our surroundings which affects the Human beings, plants, animals etc.,

Classification

Pollution may be classified into

a) Air pollution
b) Water pollution
c) Soil pollution
d) Thermal pollution
e) Nuclear hazards
f) Noise pollution
g) Marine pollution

Pollutants

“A substance which is hazardous to human beings, plants animals and environment etc is calledas pollutants.

Types of Pollutants

1) Bio-degradable: This can be degraded or decomposed by natural processes. (Ex.Vegetable wastes, animal wastes)

2) Non-bio degradable: This cannot be degraded or decomposed by natural processes. (Ex. Plastics, polythene, rubber, etc.)

Air Pollution (10 marks)**

Definition

It is defined as “the presence of one or more contaminants in air and its harmful to human beingsand animals.

Sources / causes of air pollution

Natural sources

Volcanic eruption, forest fires, biological decay, etc.

Man made sources

Thermal power plants, vehicular emissions, fossil fuels, agricultural activities etc.

Classification of air pollutants

Primary and secondary air pollutants.

Primary air pollutants

Primary air pollutants which emits directly to the atmosphere and harmful to the living beings.
E.g. CO_2, NO_2 and SO_2 etc

Secondary air pollutants

Primary pollutants may react with one another to form new pollutant which is harmful to living beings.

E.g. NO_2 / SO_2moist$\xleftarrow{/ H_2}$O HNO_3 / H_2SO_4 Primary pollutants Secondary pollutants

Table 5.1 Types, sources and effects of air pollution

S. No	**Type of air pollutants**	**Sources /causes**	**Effects**
1	CO2 (Carbon monoxide)	➢ Cigarette smoking, ➢ incomplete combustion of fossil fuel, ➢ motor vehicle exhaust	➢ Headache ➢ anemia ➢ global warming
2	NO2 (Nitrogen dioxide)	➢ incomplete combustion of fossil fuel in motor vehicles ➢ power plants	➢ Lung irritation & damage ➢ Acid rain which affects soil, aquatic bodies ➢ corrosion of metals, damage to monuments, fabrics etc.
3	SO2 (Sulphur dioxide)	➢ Coal burning in power plants ➢ Industrial processes.	➢ breathing problems ➢ Reduces visibility ➢ acid rain which affects soil, aquatic bodies , ➢ corrosion of metals, damageto monuments, fabrics etc.
4	Photo chemical smog (Brownish smoke like appearance)	➢ Chemical reactions among nitrogen oxide and hydrocarbon by	➢ Breathing problems ➢ nose, eye irritation, ➢ heart diseases.
5	Suspended particulate matter(SPM)	➢ Agriculture ➢ burning of coal in power plant ➢ industrial plants ➢ Burning diesel.	➢ Nose and throat irritation, ➢ Lung damage ➢ Asthma ➢ Cancer.
6	Ozone (O3)	➢ Chemical reactions by volatile organic compound and nitrogen	➢ Climatic change.
7	Lead	➢ Leaded petrol ➢ lead storage batteries	➢ Mental retardation inchildren ➢ Cancer.
8	Hydrocarbons	➢ Decay of vegetable matter	➢ Carcinogenic (cancer producing) effects
9	Chromium	➢ Paint ➢ Chromium manufacture ➢ Chromium plating	➢ Cancer, ➢ gastro intestinal problems ➢ affect the central nervoussystem

Control measures of air pollution

1. Use only unleaded petrol
2. Use petroleum products and other fuels that have low sulphur and ash content.
3. Reduce the number of private vehicles on the road by developing an efficient public transportsystem and encouraging people to walk or use cycles.
4. Plant more trees
5. Industries and waste disposal sites should be situated outside the city.
6. Use catalytic converters to help control the emissions of carbon monoxide and hydrocarbons

Control measures in industrial centers

1. Emission rates should be restricted to permissible levels
2. Incorporation of air pollution control equipments in the design of the plant layout
3. Continuous monitoring of the atmosphere for the pollutants should be carried out to know the emission levels.

Equipments used to control air pollution

(a) Scrubbers, (b) Cyclones (c) Bag houses (d) Electrostatic precipitators

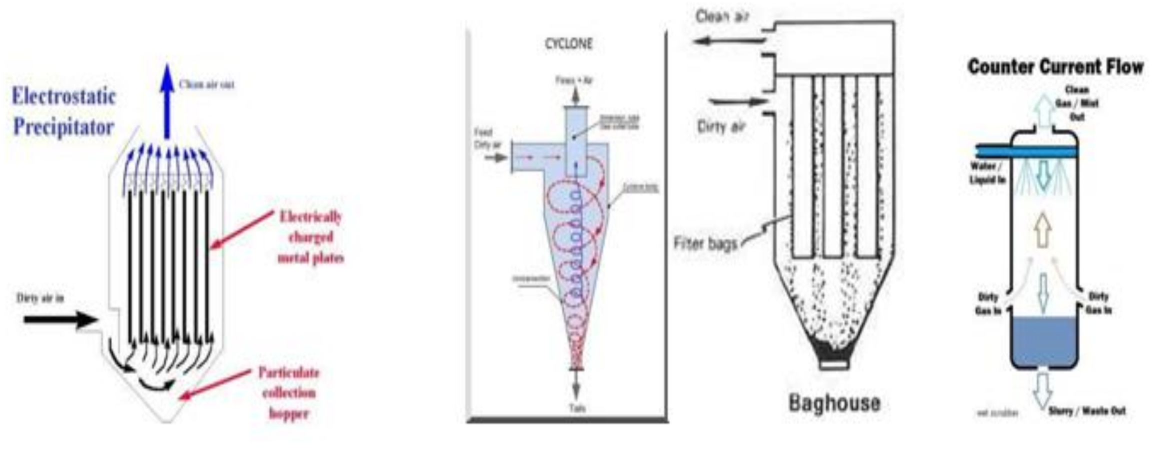


Fig 5.1

Water Pollution (5 mark)

Definition

Water pollution is defined as "the alternation in physical, chemical and biological characteristics of water which may cause harmful effects on human and aquatic life".

Sources

1. Infectious agents
2. Oxygen demanding wastes
3. Inorganic chemicals
4. Organic chemicals
5. Plant nutrients
6. Sediment
7. Radioactive materials
8. Heat

Types, sources and effects of water pollution

1. Infectious agents

Ex: Bacteria, viruses, protozoa and parasitic worms.

Sources

- Human and animal wastes.

Effects

- Variety of diseases.

2. Oxygen demanding wastes

Ex: Animal manure and plant debris that can be decomposed by aerobic bacteria.

Sources

- Sewage, paper mills, and food processing facilities.

Effects

- Wastes can degrade quality by depleting water of dissolved oxygen.

3. Inorganic Chemicals

Water soluble inorganic chemicals. Ex: Compounds of toxic metalssuch as lead, arsenic and selenium. Salt such as NaCl in Ocean water.

Sources

- Surface runoff, industrial effluents and sewage

Effects

- Genetic mutations, birth defects and certain cancers.

4. Thermal pollution (Heat) (5 mark)

Ex: Excessive heat.

Sources

- Water cooling of electric power plants
- Some types of industrial plants.
- Cooling electric power plants.

Effects

- vulnerable to disease and toxic chemicals
- fish and other organisms are affected

5. Chemical oxygen demand: (COD)

The amount of oxygen required to oxidize all the organicand inorganic impurities present in the sample

Sources

- Sewage (waste comes from house), industrial effluents (waste comes from industries)

Effects

- Harmful to aquatic life
- Unuseful to drinking and irrigation processes

6. Biological oxygen demand: (BOD)

The amount of oxygen required to oxidize all the organiccompounds present in the water sample.

Source

- Food processing Industries and paper mills

Effects

- Degrade the water quality
- Harmful to aquatic life
- Unuseful to drinking and irrigation processes

7. Sediment

E.x. soil, silt

Source

- Land erosion

Effects

- Reduce photosynthesis
- Affect food chain and food web
- Harmful to aquatic life

8. Radioactive materials

E.x. isotopes of iodine, uranium and thorium

Source

- Nuclear power plant
- Mining industries
- Nuclear weapons production

Effects

- Genetic mutations
- Birth defects
- Cancer

Control of water pollution

1. Water pollution control should be in the hands of state and central government.
2. Scientific techniques are implemented (catchment areas of rivers ponds or streams).
3. Plant more trees.
4. Reduce deforestation.
4. Public awareness.
5. Reuse, reduce and recycle (3R) of sewage effluents and industrial waste. 2 Mark (3R rule)
6. Suitable laws and practices should be framed
7. Highly qualified and experienced persons should be consulted form time to time.
8. It is not advisable to discharge any type of waste, either treated or untreated in the fresh water bodies.

Soil Pollution (5 mark)**

Definition

The contamination of soil by human and natural activities may cause harmful effects onliving things.

Sources and Effects of Soil pollution

1. Industrial wastes
2. Urban wastes.
3. Agricultural practices

4. Radioactive pollutants.
5. Biological agent

1. Industrial wastes Sources

- Pulp and paper mills, chemical industries, oil refineries, sugar factories.

Effects

- Alter the chemical and biological properties of soil.
- Affect the food chain & food web
- Disturb the bio chemical process and finally lead to serious effects on environment.

2. Urban wastes Sources

- Plastics, Glasses, metallic cans, fibers, papers, rubbers, street sweepings etc.

Effects

- **A**lter the chemical and biological properties of soil.
- Industrial waste can still be dangerous
- They cannot be easily degraded

3. Agricultural practices Sources

- fertilizers, pesticides, herbicides, and weedicides etc.

Effects

- These farm wastes, manure, slurry, are reported to cause soil pollution.
- Alter the chemical and biological properties of soil.
- Inorganic chemicals are reported to cause soil pollution

4. Radioactive pollutants Sources

- Nuclear testing laboratory and industries, radio nuclides of radium, thorium, uraniumand isotopes of K- 40 and C- 14.

Effects

- Penetrate the soil and accumulate there by creating land pollution.
- Affect brain and central nervous system
- Serious health effects

5. Biological agents Sources

- Human, animal and birds excreta (solid waste)

Effects

- Land pollution by biological agents.
- Serious effects to plants
- Affects the agriculture practice and heavy soil pollution

Control measures of soil pollution (5 mark)

1. Control of soil erosion
2. Proper dumping of unwanted materials
3. Production of natural fertilizers
4. Proper hygenic condition
5. Public awareness
6. Recycling, reduce and reuse (3R) of wastes
7. Ban on toxic chemicals.

Marine Pollution (5 mark & 10 marks)***

Definition

It is defined as "The discharge of waste substances into the sea resulting in harmful to living beings, aquatics and also degrade the quality of sea water".

Sources and Effects of marine pollution: Sources

- Dumping the untreated waste
- Sewage waste and industrial effluents.
- Garbage, agricultural discharge and pesticides

- Heavy metals (Pb, Sn, Se Cr and U)
- Huge quantity of plastics
- Heavy petroleum products
- Oil pollution of marine water

Effects

- More damage in birds as thinning of eggshell and tissue damage of egg.
- The great damage to water is caused by the petroleum products.
- Oil pollution cause damage to marine fauna (animal) and flora (plant) including algae and fungi.
- Oil spilling in the sea water causes low body temperature in birds resulting in hypothermia.
- Oil films are able to retard significantly the rate of oxygen uptake by water.
- Detergents used to clean up the spill are also harmful to marine life.

Control measures of marine pollution

- Plant for conserving marine biodiversity
- People should be educated about marine ecosystems
- Local communities must be involved
- Protecting and managing their coastal resources.
- Social and economic incentives must be offered
- Conserving and sustainable use of marine resources.
- Government must manage their own waters while extending cooperation to the neighboring states.

Noise Pollution (5 mark)

Definition

It's defined as "the unwanted or disagreeable sound that cause discomfort for all livingbeings". It is measured using "Decibel" unit.

Types of noise

1. Industrial noise
2. Transport noise
3. Neighborhood noise

Sources and Effects of noise pollution: Sources

- Transportation (Motor vehicles, buses, trucks and diesel engine vehicles)
- Celebration functions
- Elections and electric home appliances.
- Heavy machineries, industries and factories
- Road and train traffic noise
- Aircraft noise
- Neighborhood noise (Musical instruments, TV, radios, transistors, telephones and loudspeakers)

Effects

- Affect human health, comfort and efficient
- Affect central nervous system and tension
- Damage to heart, brain, kidneys and liver
- Produce emotional disturbances
- Physiological and psychological changes.
- Loss of hearing
- Neurological problems
- Birth defects and abortion
- Increase the rate of heart beat and contraction of blood vessels

Control of noise pollution

- Reduction in sources of noise
- Heavy vehicles and old vehicles may not be allowed in the populated areas.
- Noise making machines should be kept in containers with sound absorbing media.
- Proper oiling will reduce the noise from the machinery.
- Use of sound absorbing materials.
- Plant more trees.
- Through law of legislation can ensure that sound production is minimized at varioussocial functions.
- Unnecessary horn blowing should be restricted especially in vehicle congested areas.

Thermal Pollution (5 mark)

Definition

It's defined as "the addition of excess of undesirable heat to water that makes it harmful to man, animal and aquatic life".

Causes and effects of thermal pollution: Sources

- Nuclear power plant
- Toxic radio nuclides
- Emission of nuclear reactors
- Coal fired power plants
- Thermal power plants
- Heated effluents
- Heat producing industries
- Refineries steel mills
- Domestic sewage
- Hydro electric power plant

Effects

- Reduction in dissolved oxygen content of water
- Decreased as the solubility of oxygen in water
- Increases in toxicity
- Interference with biological activities
- Interference with reproduction
- increase in water temperature (harmful to aquatics)
- Affects the flora (plant) and fauna (animal)
- Changes the Metabolic activity of aquatic organisms
- Disturb spauning, hatching and migration depend on optimum temperature
- Fish migration is affected due to formation of various thermal zones.

Control of thermal pollution: Types of control methods

1. Cooling ponds
2. Cooling towers
3. Spray ponds

1. Cooling ponds

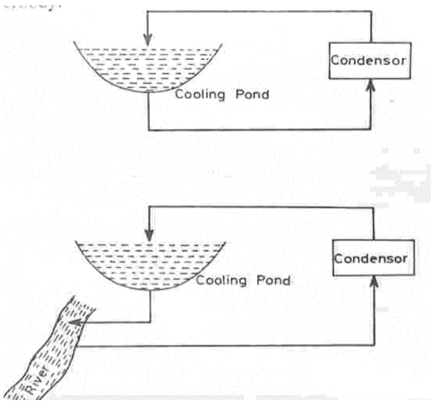


Fig 5.2

- Water from condensers is stored in ponds
- Natural evaporation cools the water
- Re-circulated or discharged in nearby water body.

2. Spray ponds

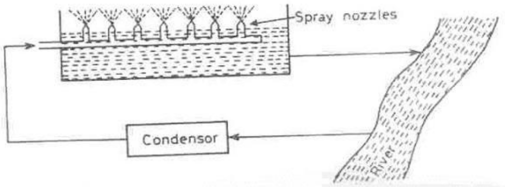


Fig 5.3

- The water from condensers is received in spray ponds.
- Here the water is sprayed through nozzles
- Fine droplets are formed.
- Heat from fine droplets is dissipated to the atmosphere.

3. Cooling tower

a) Wet cooling tower

- Hot water is sprayed over baffles.
- Cool air entering from sides takes away the heatand cools the water.
- This cool water can be recycled or discharged.

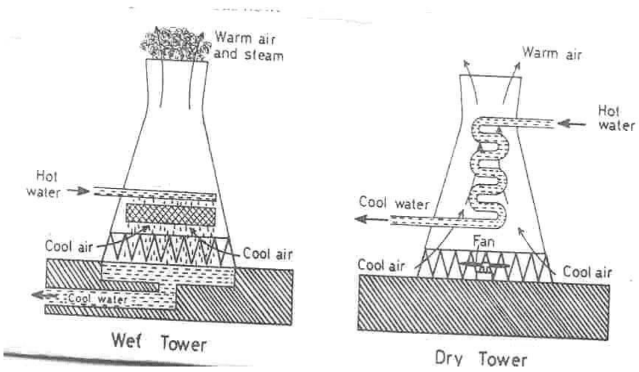


Fig 5.4

b) Dry cooling tower

- The heated water flows in a system of pipes.
- Air is passed over these hot pipes with fans.
- There is no water loss in this method

Nuclear Hazards Or Nuclear Pollution (5 mark)

Definition

It's defined as "the radioactive materials which are harmful to human beings, animals, plants and environment".

Sources and effects of nuclear pollution Sources

- cosmic rays from outer space
- radioactive radon -222
- Natural sources E.g. Soil, rocks, air, water and food which contain one or moreradioactive substances.
- Nuclear power plants
- Nuclear accidents,
- Man made sources (nuclear bomb)
- X-ray, γ- ray and cosmic ray

Effects

- Genetic damage
- Affect the brain cell and central nervous system

- Delirium (mental disorder) conversions and death
- eye is vulnerable to radiation
- Eye cataract and cancer of bone, thyroid, breast lungs and skin.
- Impair sight to eye
- Vomiting, bleeding of the gums and mouth ulcers
- Internal bleeding and blood vessel damage
- Unborn children are vulnerable to brain damage and mental retardation
- Damage of the central nervous system in early pregnancy.

Control of nuclear pollution

- Sitting of nuclear power plants should be carefully
- Proper disposal of wastes from laboratory
- Nuclear waste should be exploded underground
- Use closed cycle coolant system
- Using tightly sealed boxes and closed cycle system of nuclear waste
- Production of radio isotopes should be minimized
- Minimum number of nuclear installations should be commissioned
- Nuclear mines, wet drilling may be employed along with underground drainage
- Nuclear medicines and radiation therapy should be applied
- Nuclear fission reactions should be minimized

Solid Waste Management (10marks)***

- Management of solid waste is very important in order to minimize the adverse effects ofsolid wastes.

Types / sources of solid wastes

- Solid waste can be classified as municipal, industrial, agricultural, medical, mining wasteand sewage sludge.
- They main sources of industrial solid wastes are chemical industries, metal and mineral processing industries.

a) Urban waste Sources

- Domestic wastes – Food waste, Cloth, Waste paper.
- Commercial wastes – Packing material, cans, bottles, polythene.
- Construction Wastes – Wood, concrete, debris.

- Bio medical wastes – Anatomical wastes, infectious wastes.

b) Industrial waste Sources

- Nuclear power plants – generates radioactive wastes
- Thermal power plants – produces fly ash in large quantities

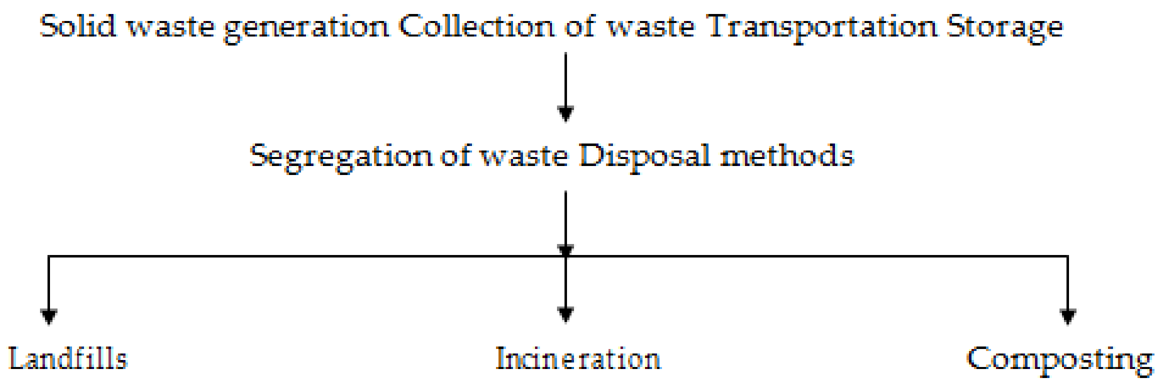
c) Chemical industries

- Produces large quantities of hazardous and toxic materials

d) Other industries

- They are produces packing materials, rubbish, organic waste, acids, alkalis, rubber,plastic, paper, glass, wood, oils, paints, dies etc.,

Chart.1 Steps involved (control method) in solid waste management Flowchart


Solid waste generation Collection of waste Transportation Storage
Segregation of waste Disposal methods
Landfills
Incineration
Composting

- Collection waste from various sources
- Transportation – to transfer the collected waste to the destination point
- Storage – To store the collected waste mean while time of the disposal
- Segregation – Home separation for recycling
- Disposal methods – It includes 3 methods

a) Land fill
b) Incineration
c) Composting

a) Land fill

- Waste materials are dumped in low lying areas

b) Incineration

- Burning of solid waste material and reducing the volume, weight and residual ash

c) Composting

- Process of converting the organic solid waste material to a kind of fertilizer manure by the anaerobic bacterial activity.

Role Of Individual In Prevention Of Pollution (10 marks)

1. Help more in pollution prevention than pollution control.
2. Use eco-friendly products.
3. Use CFC free refrigerators. (CFC – Cholro Fluoro Carbon)
4. Reduce, Recycle and Reuse (3R) waste materials.
5. Save electricity.
6. Use renewable energy resources.
7. Use biological control.
8. Use only required amount of water for various activities.
9. Reduce population growth.
10. Plant more trees
11. Reduce deforestation.
12. Use pollution free transport system.

Pollution Casde Studies

1. Bhopal gas tragedy: (Air Pollution)
2. Gulf War: (Marine Pollution)
3. Chernobyl Disaster: (Nuclear pollution)
4. Minamata Disease: (Marine Pollution)

Bhopal gas tragedy

- Pesticide factory-Union Carbide- corporation leak large volume of methyl iso cyanate –atmosphere

- Bhopal- India-midnight on December 3,1984-city- change gas chamber-within a week 10,000people died
- 1000 people turned blind- lakhs of people still continue to suffer various diseases

Gulf War

- Gulf war was fought between Iraq and US-Period of 6 weeks in 1991
- American fighters dropped a lakh of bombs-force the Iraq army to withdraw from Kuwait retreat of Iraq- burning of 700 oil wells
- near sea shore–oil from well spills out into the sea-the floating oil oversea water nearly 80 km long-burning of oil wells nearly 10 months-released huge amounts of pollutants likeCO_2 and SO_2into the atmosphere
- 1 million birds killed. Occur at Chernobyl in USSR 28th April,1986-the reactor exploded- result of uncontrolled nuclear reactions-radioactive fuel spread out in to the surrounding areas
- Killed at least 20,000 people-damage to soil, water and vegetation around 60 km.

Chernobyl Nuclear disaster

- Chernobyl is a small area in the Ukraine of Soviet Union. The explosion took place on April26.1986.
- The human error caused the unmanageable fire and explosion in the reactor due to failure of cooling system in the light water graphite reactor.
- In this accident more than 80,000 people died, 3.5 million people were affected by abnormalities, thyroid disorders, bone necrosis, skin cancer, pigment discoloration eye disease and others.
- Nearly 1, 50,000 people were evacuated to a safe place at a distance 30 km from the Chernobyl.

Minamata disease

- Minamata- Small coastal village in Japan –Chicago-chemical company produces Vinyl polymerplastics
- Industry release its effluent into Minamata sea-Effluents containing mercury ions-converted into methyl mercury- highly toxic consumed by fishes
- Affect human being through food chain-damage central nervous system-loss of vision and hearing
- Loss of muscular coordination and severe headache- nervous disorders

Chapter-VI Environmental Policies & Practices

Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act, Air (Prevention & Control of Pollution) Act; Water (Prevention and Control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature reserves, tribal populations and rights, and human Wildlife conflicts in Indian context.

Climate Change (5 mark)

Definition

The average weather of an area is called climate. "the change in the general weather condition, seasonal variation of a region over a long period" is called climate change.

Causes of climate change

- ➢ Presence of green house gases (CO_2, CCl_4, CFCs, CH_4)
- ➢ Depletion of ozone layer.
- ➢ Rotation of earth on its axis
- ➢ Uneven distribution of rainfall
- ➢ Seasonal changes

Effect of climate change

- ➢ Change the hydrological cycles results in floods and droughts
- ➢ Changes in global pattern of winds.
- ➢ Disturb the migration of birds, animals including humans
- ➢ Damage to plants, animals and humans.
- ➢ Global warming through green house effect, acid rain and ozone layer depletion.

Green House Effect/Global Warming (5 marks)

Definition (2 Mark)

It is defined as “the progressive warming of earth surface due to blanketing effect of manmade CO2 in the atmosphere.”

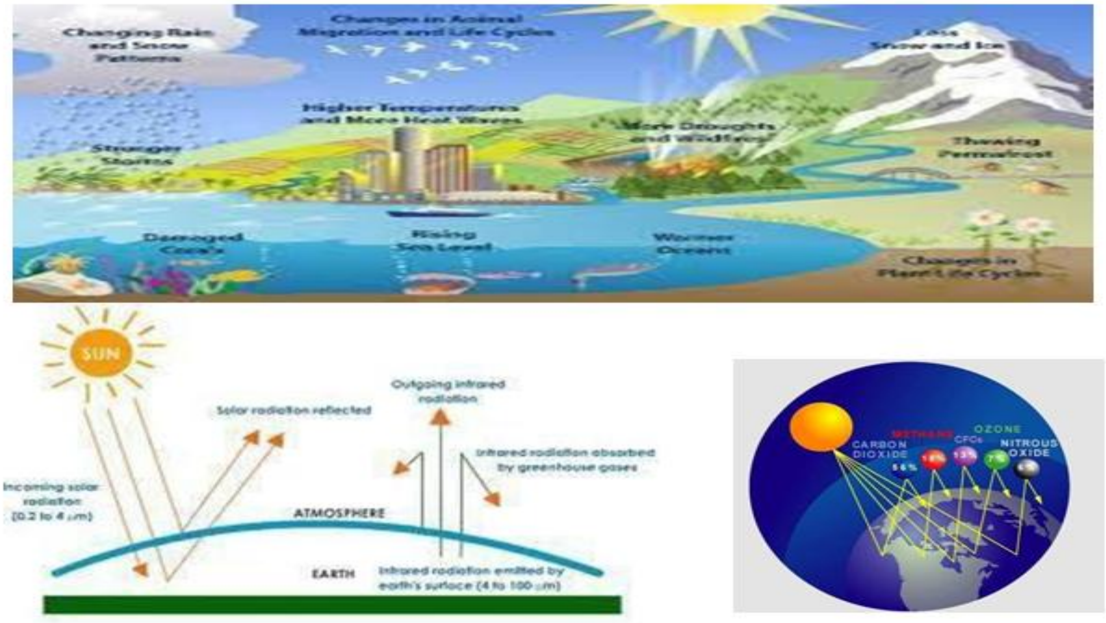

Changing Rain and Snow Patterns
Changes in Animal Migration and Life Cycles
Less Snow and Ice
Higher Temperatures and More Heat Waves
More Droughts and Wildfires
Thawing Permafrost
Stronger Storms
Damaged Coral's
Rising Sea Level
Warmer Oceans
Changes in Plant Life Cycles
SUN
Solar radiation reflected
Outgoing infrared radiation
Infrared radiation absorbed by greenhouse gases
Incoming solar radiation (0.2 to 4 μm)
ATMOSPHERE
EARTH
Infrared radiation emitted by earth's surface (4 to 100 μm)
CARBON DIOXIDE
METHANE
CFCs
OZONE
NITROUS OXIDE
56%
18%
13%
7%

Fig 6.1

Table 6.1 Major greenhouse gases and their sources

Greenhouse gases	**Human sources**
Carbon-di-oxide (CO2)	Fossil fuel burning, deforestation and plant burning
Methane (CH4)	Landfills, coal production, natural gas leaks from oil and gas Production
Nitrous Oxide (N2O)	Fossil fuel burning, fertilizers
Chloro Fluoro Carbon (CFCs)	Air conditioners. Refrigerators, plastic foams
Hydro Chloro Fluoro Carbon (HCFCs)	Air conditioners. Refrigerators, plastic foams
Hydro Fluoro Carbon (HFCs)	Air conditioners. Refrigerators, plastic foams
Carbon Tetra Chloride(CCl4)	Cleaning solvent

Effect on global warming

- Increase in sea level
- Effect on Agriculture and forestry
- Effect on water resources
- Effect on terrestrial ecosystems
- Effect on human health.
- Global temperature increases
- Flood and drought

Control measures of global warming

- Plant more trees.
- Use energy more efficiently.
- Shift to renewable energy resources.
- Shift from coal to natural resources.
- Efficiently remove CO_2 from smoke stacks.
- Reducing CO_2 emission
- Adopt sustainable agriculture.
- Implement energy conservation measures.
- Cut down the current rate use of CFC's and fossil fuel.

Acid Rain (10 Marks) Definition

It is defined as "Oxides of nitrogen (NO_2), sulphur (SO_2) produced by combustion of coal, petroleum etc, and dissolved in atmospheric water vapor (H_2O) results in the formation of acids like nitric acid, sulphuric acid etc, and reach the earth surface as Acid rain."

Mechanism of Acid rain formation

- Thermal power plants, industries and vehicles release NO_2 and SO_2 into atmosphere
- The presence of sulphur oxide and nitrogen oxide in the atmosphere under favorable conditions
- When sufficient moisture (water droplets) is present in the atmosphere
- The above oxides (NO_2 and SO_2) dissolve in the water droplets to become nitric acid and sulphuric acid
- Reach the earth as acid rain through rain water.

SO_x + H_2O H_2SO_4 (acid rain)

NOx + H2O HNO3 (acid rain)

- These strong acids increasing the acidity in rain water.

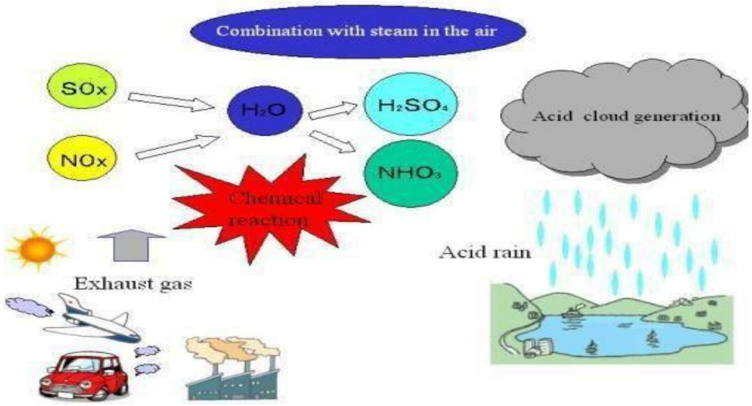


Fig 6.2

Effects of acid rain

(i) Human beings

- Destroy life – nervous, respiratory and digestive system
- Causes premature death from heart and lung disorders.

(ii) On Buildings

- Corrosion - Taj Mahal, houses, statues, bridges, metals.
- Corrodes the metal, destruction of paints and stone.(marble and lime stone)

(iii) On terrestrial and Lake Ecosystem

- Reduces the rate of photosynthesis, Fish population and bio mass production.
- Reduces growth of plants and increased sensitivity to drought and diseases.
- Reduces crop yields.

(iv) Effect of acid rain on Aquatic organisms

- The lakes and streams, where pH level decreases and aluminium levels increases may affect fishes and plants.
- It kills aquatic organisms like plants and fishes

- The activity of bacteria, fungi and other micro organisms is reduced in acidic water.
- Dead materials are slowly decomposed and the biomass production is reduced in water.

Control measures of Acid rain (5 Mark)

- Clean combustion technologies
- Using pollution control equipments
- Replacement of coal by natural gas
- Liming of lakes and soils.
- Emission of SO2 and NO2 from industries and power plants should be reduced by using pollution control equipments like scrubbers.
- Industries and power plants do not burn fossil fuels.
- Coal containing less sulphur should be used in industries and power plants
- Alternative energy of coal, natural gases, powered vehicles, battery powered cars, fuel cells etc, are used.

Ozone Layer Depletion (5 Marks)

Definition

- Ozone gas is present in the atmosphere.
- It is highly concentrated at the stratosphere between10 to 50 Km above the sea level and iscalled as ozone layer.

Importance

- O3 protects us from damaging UV radiation of the sun.
- It filters UV radiation.
- Now a day's certain parts of O3 layer is becoming thinner and O3 holes are formed. Because of this more UV radiation reaches the earth's surface.
- UV radiation affects DNA molecules, causes damages to the outer cell of plants andanimals.
- It causes skin cancer and eye disease in human beings.

Formation of O_3

- It is formed in the atmosphere by photochemical reaction $O_2 + h\nu \rightarrow O^* + O^*$
- The atomic oxygen reacts with molecular O_2 to form O_3 $O^* + O_2 + M \quad O_3 + M$
  Where M= third body like nitrogen.

O^* = Nascent oxygen / atomic oxygen

Mechanism of O_3 layer depletion

- Refrigerators, air conditioners, aerosol sprays and cleaning solvents release CFC s into the atmosphere.
- CFCs releases chlorine which breaks O_3 to O_2 $Cl + O_3 \rightarrow Cl\,O + O_2 (g)$ $Cl\,O + O_3 \rightarrow Cl + O_2$
- Each chlorine atom is capable of breaking several O_3 molecules.
- It is a chain reaction.
- 1% loss of O_3 results in 2% increase in UV rays reaching the earth surface.

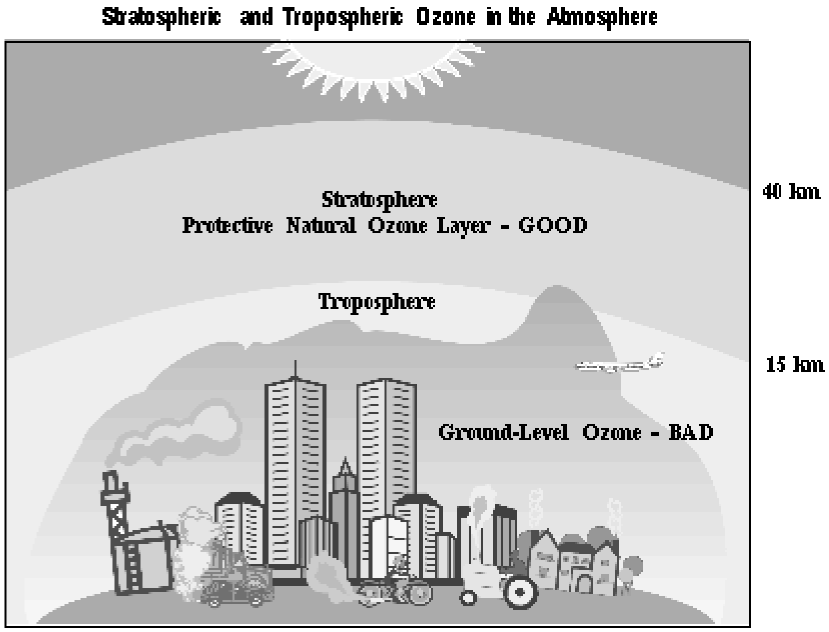

Stratospheric and Tropospheric Ozone in the Atmosphere
Stratosphere
Protective Natural Ozone Layer - GOOD
40 km
Troposphere
15 km
Ground-Level Ozone - BAD

Fig 6.3

Ozone depletion chemicals

- CFC, HCFC, BFC.
- Sometimes atmospheric sulfur dioxide
- It is converted in to H_2SO_4 which increases the rate of O_3 layer depletion.

Effects of ozone layer depletion (5 Mark)

(i) Effects on human beings

- UV rays cause skin cancer.
- Increases the rate of non melanin skin cancer in fair colored people.
- Prolonged expose to UV rays leads to actinia, Katatities (slow blindness) and cataracts.

(ii) Effects on aquatic system

- UV rays affects phytoplankton, fish, larval crabs.
- Phytoplankton consumes large amounts of CO2
- Decrease in population of phytoplankton.

(iii) Effect on Materials

- Degradation of paints, plastics and other polymeric materials.

(iv) Effect on Climate

- More amount of CO2 in atmosphere which contributes to global warming.

Control measures

- Manufacturing and using of O3 depleting chemicals should be stopped.
- Use of methyl bromide which is a crop fumigant should be controlled.
- Replacing CFC s by other materials which are less damage.

Nuclear Accidents And Nuclear Holocaust

Nuclear energy

Energy released during a nuclear reaction is called nuclear energy. Nuclear reactors produce the nuclear energy either by nuclear fission or fusion.

Nuclear accidents

The most serious hazards to human and environmental health from the nuclear accident is the release of large amounts of nuclear energy and radioactive products into the atmosphere.

Types of nuclear accidents

- Nuclear test;
- Nuclear power plant
- Improper disposal of radioactive waste
- Accident during transport
- Core melt down

Effect of Nuclear radiations

- Breaking of chemical bonds such as DNA in cells.
- Suffer from fatigue, vomiting and hair loss.
- Affect bone marrow, blood cells, natural resistance and blood to fail clot.
- Kills the organisms by damaging the tissues of heart and brain.

Case Studies

- Chernobyl Nuclear disaster, Bhopal gas Tragedy

Waste Land Reclamation (5 mark)

Waste land

- The land which is not in use, it is unproductive, unfit for cultivation, grazing and another economic uses.

Types of waste land

- Uncultivable waste land:- Barren rocky areas, hilly slopes, sandy deserts.
- Cultivable waste land:- - degraded forest lands, gullied lands, Marsh lands, saline lands

Causes for waste land formation

- Soil Erosion, Deforestation, Water logging, Salinity.
- Excessive use of pesticides.
- Construction of dams and power projects.
- Over-exploitation (excess usage) of natural resources.
- Sewage and industrial wastes.
- Mining activities

Objectives of waste land reclamation

- To improve the physical structure and quality of the soil
- To prevent soil erosion
- To avoid over – exploitation of natural resources

- To conserve the biological resources.

Methods of waste land reclamation

- Drainage
- Leaching
- Irrigation practices
- Green manures and bio fertilizers
- Application of Gypsum
- Afforestation programmes
- Social forestry programmes.

Consumerism and Waste Products

Consumerism

It is defined as ”the Consumption of resources by the people”.

Traditionally favorable rights of sellers

- Right to introduce product, price, Incentives
- Traditionally buyer rights
- Right to buy, right to expect the product to perform as claimed

Important information to be known by buyers

- About ingredients
- Manufacturing dates
- Expiry date, etc.

Objectives of Consumerism

- Improves rights and power of the buyers
- Making the manufacturer liable
- Reuse and recycle the product
- Reclaiming useful parts (Ex; computer, TV, polymeric goods)
- Reusable packing materials
- Health and happiness.

Sources Of Wastes

- Agriculture
- Mining
- Industrial and municipal waste
- Ex: Glass, papers, garbage's, food waste, automobile waste, dead animals etc.

E – Waste (Electronic and electrical waste)

- Electronic equipments like Computers, printers, mobile phones, Xerox machines, calculators etc.
- After using these instrument, they are thrown as waste

Effects of wastes

- Dangerous to human life
- Degrade soil
- Cadmium in chips, Cathode ray tube, PVC causes cancer and other respiratory problems.
- Non biodegradable plastics reduce toxic gases.

Factors affecting consumerism and generation of wastes

1. People over – Population

- It occurs when there are more people than the available supply of food and water
- This causes degradation of resources, poverty and death
- This occurs in less developed countries (LDCs).

2. Consumption over population

- It occurs when there are less people than the available resources.
- This occurs in more developed countries (MDCs).
- Here population size is smaller

Objectives of Consumerism

- It improves the rights and powers of both sellers and buyers.
- It maintains the good relationship between sellers and buyers.
- Manufacturing products may reuse and recycle after usage.
- Manufacturing products should be easily degradable and not cause any pollution.
- Manufacturer should be liable for the entire life cycle of a product.
- Active consumerism improves human health and happiness and also it saves resources.

Environmental Legislation and Law (10 mark)

- ➢ The "Environmental Protection Act" was established in the year 1980 for the production and improvement of environment and for the prevention, control and abatement of environmental pollution.

Objectives

- ➢ Protection and improvement of environment(air, water and land)
- ➢ Prevention of hazards to all living creatures (humans, plants and animals).
- ➢ Maintenance of harmonious relationship between human beings and environment.

Important protection Act

1. The Water (Prevention and control of Pollution) Act 1974.
2. The Air (Prevention and Control of pollution) Act, 1981.
3. Wild life protection Act,1972.
4. The Forest (conservation) Act, 1986.
5. The Environment (protection) Act, 1986.
6. The Motor Vehicles Act, 1988.

Air (Prevention And Control Of Pollution) Act

Powers of the State Government are

- Power to obtain information.
- Power to take samples.
- Power of prohibition on disposal of polluting matter into a stream or well.
- Consent of State Board.
- Penalties for violation of the provision of the act.

Functions of Central Board under section 165-4

- To promote cleanliness of streams and wells in different areas of the State. Their
- To advise the Central Government on matters concerning the prevention and control ofwater pollution.
- To produce Technical assistants and guidance to the State Board to carry out research inprevention and control of water pollution.
- To organize training of people engaged in pollution control.
- To lay down standards for stream or wells.
- To prepare manuals, codes or guides for treatment and disposal of sewage and industrial effluents.
- To establish or organize laboratories for analysis of water sample from any streams,wells or trade effluent
- The state pollution control board also have similar functions to be executed at state level and are governed by the directions of CPCB.

Water (Prevention And Control Of Pollution) Act

It was established in the year 1974.

The main objectives are
- Prevention and control of water pollution.
- Maintaining and restoring wholesomeness of water.
- Establishment of boards of the prevention and control of water pollution.

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Wild Lfe Protection Act (5 mark)**

- The wild life act was enacted on 9th September in the year 1972 to protect animals and birds.
- It established the regulation of possession, acquisition, and trade in wild animals and animal products.
- Te act also provides for constituition of a wild life advisory board to advise the State Government in selection of areas to be declared as sanctuaries and National parks, in formulation of the policies for protection and conservation of wild life and in any other matter related to the wildlife.

- It imposes restrictions on hunting of wild animals. Packing, uprooting, acquiring and collecting specified plants are prohibited from any forest land.

Forest Conservation Act (10 Mark)

- With a view to check further deforestation, on 27th December 1980, Forest(conservation) Act was enacted.
- It provides for the conservation of forest and imposes restrictions on the deservations of reserved forest and use of forest land for non forest purpose.
- Compensatory a forestation is required in case of where diversion of forest land is permitted.

Environment (Protection) Act

- This act is enacted for the safe disposal of waste by the industries and obligates industriesto submit "Environment Report" for every year.
- By this act the government has power to close down any firm which violates environmental quality.

The main aim of this act is:
- To provide protection and improvement of environment.
- To provide for the regulation of discharge of environmental pollutants and handling of hazardous substance.
- To provide for the creation of an authority or authorities, which is provided with powers to protect environment.
- To provide for speedy response in the event of accidents threatening environment and deterrent punishment to those who endanger human environment, safety and health.

Issues Involved In Enforcement Of Environmentallegislation Law (10 Mark)

Following are the issues

- Even in developed countries, subsidized and mandated pollution control equipment has often been ineffective.
- Subsidized charges for energy water, pesticides and fertilizer contribute to pollution problems.

- Abatement will be cheap if polluters face an emission tax, because only polluters with low abatement cost will choose to reduce emissions, while those with higher costs will prefer to pay the charge.
- In addition, there are some "indirect instruments"- those that are not directly related to emissions but create pollution unintentionally. Public finance policies, through their impact on relative prices, will often have a impact on pollution.
- In the real world, monitoring each pollution is often costly or impossible, and thus it might be more effective to use selective taxes or regulations to stimulate pollution control indirectly.
- Most regulatory agencies lack the personnel and other resources to inspect and monitor all emission controls within their jurisdictions.

Public Awareness (5 Mark)**

- Our environment is presently degrading due to many activities like pollution,deforestation, overgrazing, rapid industrialization and urbanization.
- In order to conserve our environment, each and every one must be aware about our environment problems.

Objectives of public awareness

- Create awareness among people of rural and city about
- ecological imbalances
- local environment
- technological development
- Various development plants.
- To organize meetings, group discussion on development, tree plantation programmers exhibitions.
- To learn to live simple and eco-friendlily manner.

Methods to create environmental awareness

- In schools and colleges
- Through mass – media (Radio, TV and cable network)
- Cinema
- Newspapers
- Audio - Visual media
- Voluntary organizations (NCC, NSS, Rotary club)
- Traditional techniques (dramas, folk plays)

- Arranging competitions (story writing, essay writing and painting)
- Leaders appeal (social reformers)
- Non – government organizations. (NGOs)
- Awareness regarding the state of environment is a must for each and every person livingon this plant.

Women And Child Welfare (5mark)***

Objectives of Women welfare

- To provide proper education
- To impart vocational training
- To insist the need of healthy nutrition during pregnancy period
- To increase the awareness about family planning
- To avoid female infanticide
- To increase the employment opportunities
- To restore the dignity, equality, and respect for women
- Suffer gender discrimination and devaluation at home, at workplace, in matrimony, in inheritance, in public life and power
- Women – performs multiple roles
- Ministry of Women and child development – High number of cases of abduction, dowry deaths, rape, domestic violence, criminal offences and mental torture to women, needs immediate attention

Child Welfare

- Children are considered to be the assets of a society
- But about a million babies, out of 21 million born every year in India are abandoned soon after their birth due to different socio-economic reasons.
- About 20 million children in our country are estimated to be working as child labours.
- Poverty is the main reason to drive these children into long hours of work in miserable, unhealthy conditions
- Do not get the minimum nutritive food, education, and recreational facilities, which are their rights.
- Awareness regarding the proper care of children – need of the hour

Chapter-VII
Human Communities and the Environment

Human Communities and the Environment

- Human population growth, impacts on environment, human health and welfare.
- Resettlement and rehabilitation of projects affected persons; case studies.
- Disaster management: floods, earthquake, cyclone and landslides.
- Environmental movements : Chipko, Silent Valley, Bishnois of Rajasthan.
- Environmental ethics : Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies(e.g. CNG Vehicles in Delhi)

Population

It is defined as a “group of individuals belongs to the same species, which live in a given area at a given time”

Population Density

It is defined as “the number of individuals of the populations per unit area or per unit volume”

Parameters affecting population size

1. Birth rate / Natality: it is the number of live birth per 1000 people in a population in agiven year
2. Death rate / Mortality: it is the number of live death per 1000 people in a population in agiven year
3. Immigration: it denotes the arrival of individuals from neighboring population
4. Emigration: it denotes the dispersal of individuals from the original populations to newareas.

Population Growth (5mark)**

The increase in population due to “low death rate and high birth rate” is called population growth.

Causes of rapid population growth

- The rapid population growth is due to decrease in death rate and increase in birth rate.
- Availability of antibiotics, immunization, increased food production, clean water and air decreases the famine-related deaths.
- In agricultural based countries, children are required to help parents in the field that iswhy population increases in the developing countries.

Characteristics of population growth

➢ Exponential growth

Population growth occurs exponentially like 10, 102, 103, 104 etc.

➢ Doubling time

The time require for a population to double its size Td (doubling time) = 70 / r (r-annualgrowth rate)

➢ Infant mortality rate

Percentage of infants died out of those born in 1 year

➢ Total fertility rate (TFR)

It is the average number of children delivered by women in her life time

➢ Replacement level

Two parents bearing two children will be replaced by their off spring.

➢ Male/female ratio

The ratio of girls and boys should be fairly balanced in society

➢ Demographic transition

Death rates and birth rates fall due to improved living conditions.

➢ Problems of population growth

- Increasing demands for food and natural resources
- Inadequate housing and health services
- Loss of agriculture lands
- Unemployment
- Environmental pollution

Variation of Population Among Nations

- The human population has grown faster in the 20th century than ever before.
- Only 25% in the Most developed countries (USA, Canada, Australia).
- 80% in the Less developed countries (South America, Africa, and Asia).
- The annual rate of population growth experienced in developing countries is three times higher than when compared to developed countries.
- The density of population is very low in Antarctica and very high in Asia and Europe
- Density of Asia‟s population is approximately three times higher than the world
- China was the most population country throughout the 20th century
- India may win the race in the 21st century
- Ethiopia with about 18 million people 50 years ago is likely to grow at least tenfold overa century
- Bangladesh with very small area is already overcrowded at 128 million people.
- The population of Japan will shrink to 100 million by 2050, from the present 126 million.
- Europe will constitute only 7% in 50 years from 72% present population

Variation of population based on age structure

1. Bell shaped – France, USA, and UK. (stable)
2. Pyramid shaped – India, Bangladesh, and Ethiopia. (increase)
3. Urn shaped – Germany, Italy, Sweden, Japan (decrease)

Bell shaped variation of Population structure – France, USA, and UK. (Stable)

- It shows that, the pre-productive age group population (0 - 14 years) and reproductive age group population (15-44 years) are more or less equal.
- Show the people entering in to the reproductive age group will not change the population and thus the population growth is stable.

Pyramid shaped variation of Population structure–India, Bangladesh and Ethiopia. (Increase)

- It shows that, the pre-productive age group population (0 - 14 years) is more, indicated at the base of the pyramid, and post-reproductive age group population (above 45 years) is less, indicated at top of pyramid.
- The large number yong age people will soon enter in to reproductive age group population (15 - 44 years), which increases the population growth.

Urn shaped variation of Population structure – Germany, Italy, Sweden, Japan (decrease)

- It shows that, the pre-productive age group population (0 - 14 years) is smaller than the reproductive age group population (15 - 44 years).
- In the next 10 years, the number of people in the reproductive age group is less than the before, resulting in a decrease of population growth.

Population Explosion (5 mark)

It is defined as “the enormous increase in population due to low death rate and high birth rate”.

Causes

- Modern medical facilities, life expectancy, illiteracy.

Effects

- Poverty, Environmental degradation, over–exploitation of natural resources, threat, communal war.

Remedy

- Through birth control programs.

Family Welfare Programme

Objectives

- Slowing down the population explosion
- Over exploitation of natural resources

Importance of Family Welfare Programme

- To decrease the population explosion
- To minimize Air, Water, and Soil pollution
- To reduce the human impact on biodiversity
- To lower the energy consumption

Family Planning Programme

Objectives

- Reduce infant mortality rate.
- Encourage late marriages.
- Improve women‟s health.
- Control of communal diseases.
- Constrain the spread of AIDS / HIV

Family Welfare Programme in India

- India started family planning programme in 1952, when the population was nearly 400million.
- In 1978, raised the marriage age from 18 to 21 for men and 15 to 18 for women
- Permanent methods or sterilization by minor surgery
- Tubectomy in female
- Male sterilization or Vasectomy
- Both are very simple procedures, done under local anesthesia, are painless, and patients have no post- operative problems

- Vasectomy does not cause any loss in male‟s sexual ability
- Temporary birth control methods are:
  (i) use of condoms
  (ii) Intrauterine devices (copper T‟s)
  (iii) OC Pills and Injectable drugs

Environment And Human Health (10 marks)

- A physically fit person not suffering from any disease is called a healthy person”
- According to the World Health Organization (WHO) in 1948, “Health is a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity”

Factors influencing human health

- Nutritional factors
- Biological factors
- Chemical factors
- Psychological factors

Important hazards and their health effects

Table 7.1 Physical hazards and their health effects

S. No	**Physical hazards**	**Health effects**
1	Radioactive radiations	1. Affects the cells in the body and the function of glands and organs 2. suffer from cancer
2	UV radiations	Skin cancer
3	Global warming	Temperature increases cause famine, mortality
4	Chlorofluro	Damage O3 layer, allows more UV-rays, cause skin
5	Noise	Painful and irreparable damage to human ear

Table 7.2 Chemical hazards and their health effects

S.No	**Chemical hazards**	**Health effects**
1	Combustion of Fossil fuels	Asthma and lung diseases
2	Industrial effluents	Kill cells and cause cancer and death
3	Pesticides	Affect the food chain
4	Heavy metals	Contaminate water, cause ill effects

Table 7.3 Biological Hazards and their health effects

S. No	**Biological hazards**	**Health effects**
1	Bacteria, Viruses and Parasites	Diarrhea, malaria, anaemia, cholera

Control and prevention

- Always wash your hands before sitting for food
- Cut short and clean your nails
- Maintaining the skin, teeth, hair
- Drinking chemical treated and filtered water
- Before cooking wash the vegetables and fruits with clean water

Human Rights 5mark***

- “Human rights are the fundamental rights, which are possessed by all human beings irrespective of their cast, nationality, sex and language”.

➢ Human right to freedom

1. Every citizen has the freedom to express his views freely
2. They have full rights to starts any profession

- Human right to property : Every human beings has the right to earn property
- Human right to freedom of religion: freedom to choose their religion according to his wishes.
- Human right to culture and education: equal rights both in culture, language and education.
- Human right to constitutional remedies: fundamental rights to he / she can go to the court for protections.

- Human right to equality: All citizens are equal before the law and employment.
- Human right against exploitation: every citizen has the right to fight against exploitation.
- Human right to food and environment: right to get sufficient healthy food, safe drinking water and healthy environment.
- Human right to good health: right to have very good physical and mental health.

Value Education (5 mark)

- Education is nothing but learning, through which knowledge about the particular thing can be acquired.

Types of education

1.Formal education

- All learning process in formal education is self related.

2.Value education

- It is an instrument used to analyze our behavior and provide proper direction to our youth.
- It teaches them the direction between right and wrong, to be compassionate, helpful, loving, and generous and tolerant.

3.Value-based environment education

- Environment education provided knowledge about principles of ecology and biodiversity

Objectives of value education

- To improve the integral growth of human begins.
- To create attitudes and improvement towards sustainable lifestyle.
- To increase awareness about our national history our cultural heritage, constitutional rights, national integration, community development and environment.
- To create and develop awareness about the values and their significance and role.

- To know about various living and non- living organisms and their interaction with environment.

Types of values

1.Universal values / Social value

- It tells about the human conditions.
- They are reflected in life, joy, love, compassion, tolerance, service, truth, etc.

2.Cultural values

- It varies with respect to time and place
- These are concerned with right and wrong, good and bad, true and false and behaviorof human beings.

3.Individual values

- Parents and teachers are the main key to shape our Individual values.
- It is reflected in Individual goals, relationships, commitments, etc.

4.Global values

- The human civilization is a part of the planet and similarly nature and natural phenomena over the earth are inter connected and inter link with special bonds of harmony
- If this harmony is disturbed anywhere there will be an ecological imbalance leading to catastrophic results.

5.Spiritual values

- It promote conservationism and transform our consumerist approach
- It is reflected in self-restraint, self-discipline, reduction of wants, etc.

HIV / AIDS (10 marks)

AIDS is the abbreviated form for **A**cquired **I**mmune **D**eficiency **S**yndrome caused by a virus called HIV (**H**uman **I**mmune deficiency **V**irus).

Origin of HIV/AIDS

- Through African Monkey
- Through Vaccine Programme
- African monkey or Chimpanzees To human.

(a) Polio, small pox vaccine from monkey‟s kidney-Africa. (b)Hepatitis-B viral vaccine-Los Angles and New York.

Factors influencing modes of Transmission of HIV

- Unprotected sex with infected person.
- Using needles or syringes from HIV positive person.
- During pregnancy, breast feeding HIV transmits from mother to infant babies.
- Blood transfusion during accident and pregnancy.
- Biologically the male to female transmission is 2 to 4 time more efficient than female to male
- Women‟s cervical tissue is more vulnerable to HIV than men.

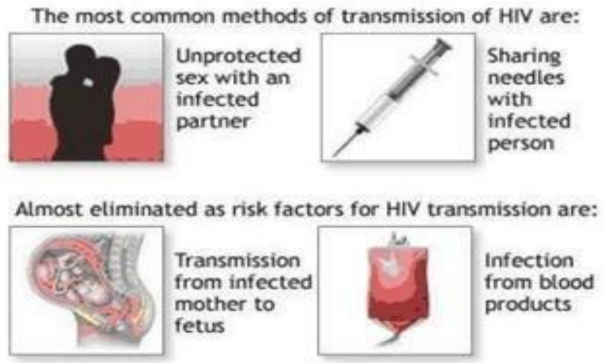
The most common methods of transmission of HIV are:
Unprotected sex with an infected partner
Sharing needles with infected person
Almost eliminated as risk factors for HIV transmission are:
Transmission from infected mother to fetus
Infection from blood products

Fig 7.1

Tests for HIV

- ELISA - test
- Western plot - confirmation test

Factors not influencing transmission of HIV

- Tears, food, air, cough, handshake and normal kissing
- Mosquito flies and insect bites
- Sharing of utensils, clothes, toilets and bathroom

Effects

- Death
- Loss of labor
- Inability to work
- Lack of energy

Function of HIV in human body

- White blood cells (WBC) are responsible for the formation of antibodies called T – helpercells.
- T – Helper cells are the key infection fighter in the immune system. Once HIV cells are enter into the body they destroy the T- cells and cause many infectious diseases.

Symptoms of Affected Persons

1.Minor symptoms

- Persistent cough for more than one month
- General ski disease
- Viral infection
- Fungus infection in mouth and throat
- Frequent fever, headache and fatigue.

2.Major symptoms

- Diarrhea for more than one month
- TB for more than one month
- Fall of hairs
- 10% of body weight loss within short period.

Control and Preventive measures

- Education.
- Prevention of Blood borne HIV transmission.
- Primary health care.
- Counseling services.

- Drug treatment. (a) AZT (Azido thymidine or Zidovudine or Retrovin)(b) DDI (Dideoxyinosine)

Role of Information Technology In Environment Protection (10 mark)

Information technology means collection, processing, storage and dissemination of information.

Role of Information Technology in Environment

- Globalization is a watch word today
- The various technologies and techno-products in the field of information – such as the telephone, radio, television, computers, internet, fax, remote sensing satellites, and e-mailsmade rapid access to much more information on a global scale.
- Scientific information now doubles about every 12 years, and general information doubles about every 2.5 years
- Some of the beneficial effects of information technology are given below:

1.Remote Sensing

- Remote sensing technology helps to collect data in the form of images and provide for manipulating, analyzing and visualizing these images.

Components - A platform, aircraft, a balloon, rocket and satellite.

Functions

- Origin of electromagnetic energy
- Transmission of energy
- Interaction of energy
- Detection of energy
- Preprocessing of data
- Data analysis and interpretation
- Integration and other applications.

Applications

- In agriculture, forestry, land cover, water resources.

2.Data Base

- Collection of inter related data on various subjects.

Applications

- Ministry of environment and forest (MEF)
- National management information system (NMIS)
- Environmental information system. (ENVIS)

3.Geographical information system (GIS)

- It is a technique of superimposing various thematic maps using digital data on a large number of inter-related aspects.

Application

- Thematic maps are super imposed using software.
- Interpretation of polluted zones
- To check unplanned growth and related environmental problems.

4.Satellite data

- Helps in providing reliable information and data about forest cover
- It Provide information about atmospheric phenomena like monsoon, ozone layerdepletion, smog.
- Reserves of oil, minerals can be discovered.

5.World Wide Web

- It provides Current data about the environment.

Applications

- Online learning centre provides the current and relevant information on principles, problems and application of environmental sciences.
- Digital files or photos, animations on environmental studies.

Role Of Information Technology In Human Health

The health service technology involves three systems

- Finance and accounting
- Pathology
- Patient Administration – clinical system.

Applications

- Data regarding birth and death rates
- To monitor the health of the people effectively
- The information regarding the outbreak of epidemic diseases.
- Online Consultation
- Drugs and its replacement.

Disaster Management (5 mark)

Definition

It is defined as "event, concentrated in time and space, in which society or sub-division of society undergoes severe danger and causes loss of its members and physical property"

Flood

It is defined as "Water flow exceeds the carrying capacity of the channel within its banks,the excess of water overflow on the surroundings"

Causes

- ➢ Heavy rainfall
- ➢ Sudden Snow melt
- ➢ Clearing of forest for agriculture
- ➢ Sudden release of water from dams

Effects

- Damage to building and property
- Soil erosion is the major loss of agriculture
- Great economy loss and health related problems

Control measures

- River - networking in the country also reduce flood
- Afforestation
- Proper weather report and prior intimation to the people.

Earthquake (10 marks)

It is defined as "sudden vibration on earth surface due to the sudden release of tremendous amount of energy stored in the rocks under the earth crust."

Causes

- Underground nuclear testing
- Volcanic eruption
- Pressure of manmade dams, reservoirs and lakes
- movements of plates of earth

Effects

- Cause **Tsunami** (earthquake occur under the sea)
- In hilly and mountain areas may cause landslides
- Damage the settlement and transport system

Control measures

- Governments are informing to the people earlier about the earthquake.
- Building should be designed
- Wooden houses are preferred in earthquake prone zone

Cyclone

Cyclone is "meteorological phenomena intense depressions forming over the open oceansand moving towards the land"

Causes

- It is formed because of heat and moisture.
- Sea surface temperature (SST) should be above 260oC.
- Spin at the speed of 10-30 km per hour and diameter varying between 100-1500 Km.
- In India it occurs mostly in Bay of Bengal.

Effects

- Damage to human life, crops, roads, transport, communication, etc.
- Slow down the developmental activities of the area.

Control measures

- planting more trees on coastal areas
- construction of dams
- Radar system is used to detect cyclone

Landslides

"The movement of earth materials like coherent rock, mud, soil and debris from higherregion to lower due to gravitational pull" is called landslide.

Causes

- Earthquake, shock, vibration
- Deep water ground mining
- Movement of heavy vehicles on the unstable sloppy region

Effects

- Increase in soil erosion
- Block the roads
- Damage the houses, crop yield, live stock etc.

Control measures

- Planting of deep rooted vegetation
- Encouragement for construction of bridges in water ways
- Unloading the upper parts of the slope
- Concrete support can be made at the base of the slope

Text Book of Environmental Biology

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